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A | Biologie

Revision of the *Armadillidium* klugii-group ■ Caenidae from East Kalimantan ■ Staphylinidae of Crete ■ Revision of *Herbertfranziella* ■ Tenebrionidae from New Guinea ■ *Odontoedon* from China ■ Speciation in *Graphium sarpedon* ■ Shore fishes of Europa Island

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Natural History

A (Biology)

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Revision of the *Armadillidium klugii*-group (Isopoda: Oniscidea)

Helmut Schmalfuss

Abstract

The *Armadillidium klugii*-group from the eastern shores of the Adriatic and Ionian Sea is characterized by regular yellow or reddish dots on the tergites and epimera of the same color. It consists of the nominal species *Armadillidium klugii* Brandt, 1833, *A. albanicum* Verhoeff, 1901, *A. inflatum* Verhoeff, 1907, *A. werneri* Strouhal, 1927, *A. flavoscutatum* Strouhal, 1927 and *A. cetinjense* Strouhal, 1927. The investigation of type material and of unpublished collections led to the following results: *A. albanicum*, *A. inflatum* and *A. cetinjense* have to be considered as junior synonyms of *A. klugii*, as no consistent differences could be found for a differentiation of these taxa on the species level. *A. werneri* and *A. flavoscutatum* show conspicuous morphological differences towards *A. klugii*, so they are treated as separate species. The diagnostic characters of *A. klugii* and *A. flavoscutatum* are described and illustrated. All records of these two species, including a number of unpublished samples, are mapped.

Keywords: Isopoda, Oniscidea, *Armadillidium klugii*-group, revision, Greece, Albania, Croatia, Montenegro, Hercegovina.

Zusammenfassung

Die *Armadillidium klugii*-Gruppe von der Ostküste des Adriatischen und Ionischen Meeres ist durch regelmäßige gelbe oder rötliche Flecken auf den Tergiten und durch ebenso gefärbte Epimeren gekennzeichnet. Die Gruppe besteht aus den nominellen Arten *Armadillidium klugii* Brandt, 1833, *A. albanicum* Verhoeff, 1901, *A. inflatum* Verhoeff, 1907, *A. werneri* Strouhal, 1927, *A. flavoscutatum* Strouhal, 1927 und *A. cetinjense* Strouhal, 1927. Die Untersuchung von Typenmaterial und von nicht publizierten Aufsammlungen führte zu folgendem Ergebnis: *A. albanicum*, *A. inflatum* und *A. cetinjense* müssen als jüngere Synonyme von *A. klugii* betrachtet werden, da keine durchgehenden Unterschiede gefunden wurden, die eine Trennung auf Artebene rechtfertigen würden. *A. werneri* und *A. flavoscutatum* zeigen hingegen auffällige morphologische Unterschiede zu *A. klugii*, sodass sie als separate Arten behandelt werden. Die diagnostischen Merkmale von *A. klugii* und *A. flavoscutatum* werden beschrieben und abgebildet. Alle Nachweise dieser beiden Arten, einschließlich einer Reihe von bisher nicht publizierten Proben, werden auf einer Karte dargestellt.

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1 Introduction

During a revision of the Greek species of *Armadillidium* (compare Schmalfuss 2011: 2) the question arose whether *A. albanicum* Verhoeff, 1901 and *A. inflatum* Verhoeff, 1907 might be synonyms of *A. klugii* Brandt, 1833. The investigation of type material of these three taxa and of *A. cetinjense* Strouhal, 1927 and additionally of many unpublished samples of *A. klugii* from the eastern coast of the Adriatic and Ionian Sea led to the result that these four taxa are conspecific. Two more species, *A. werneri* Strouhal, 1927 and *A. flavoscutatum* Strouhal, 1927 are very similar to *A. klugii*, including the color pattern. They can, however, be separated morphologically. An additional species which seems very similar to *A. klugii* is *A. bulgaricum* Frankenberger, 1941 from two localities in southwestern Bulgaria and the Bulgarian Black Sea coast. This species shares the same color pattern with the treated species, but the description is insufficient and the type material was not available for a reinvestigation, so the systematic status of *A. bulgaricum* remains questionable. In the present paper the diagnostic characters of *A. klugii* and *A. flavoscutatum* are described and illustrated, unpublished records are reported and all records are presented on a map.

Robust conclusions on the phylogenetic relationships of these very similar and certainly closely related taxa cannot be reached without molecular investigations. Such analyses were, however, outside the scope of the present paper, which presents the results of a detailed morphological revision of the considered taxa.

Abbreviations

A.	*Armadillidium*
BMNH	British Museum of Natural History London
MNB	Museum für Naturkunde Berlin
NMW	Naturhistorisches Museum Wien
SMNS	Staatliches Museum für Naturkunde Stuttgart (with numbers of isopod collection)
ZSM	Zoologische Staatssammlung München

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The following persons donated or loaned samples of the treated species: Dr. O. Coleman (MNB), Dr. R. Grimm (Tübingen), Dr. J. Kontschan (Budapest), M. Lowe (BMNH), Dr. C. Rieger (Nürtingen), Dr. V. Haas (Munich), Dr. G. Burmeister (Munich), Dr. H. Pieper and O. Runze (Schwentinental), G. Miksch (Winterbach); Drs. S. Sfenthourakis (Lefkosia) and S. Taiti (Florence) helped to improve the original manuscript; J. Reibnitz (SMNS) edited the illustrations and Dr. K. Wolf-Schwenninger (SMNS) operated the scanning electron microscope. To all of them I wish to express my sincere thanks.

2 Species revisions

2.1 *Armadillidium klugii* Brandt, 1833 (Figs. 1–14, map Fig. 21)

Synonyms

Armadillo astriger C. Koch, 1841, *Armadillo guttatus* C. Koch, 1841, *Armadillo pustulatus* C. Koch, 1841, *Armadillidium albanicum* Verhoeff, 1901 (**n. syn.**), *Armadillidium inflatum* Verhoeff, 1907 (**n. syn.**), *Armadillidium cetinjense* Strouhal, 1927 (**n. syn.**).

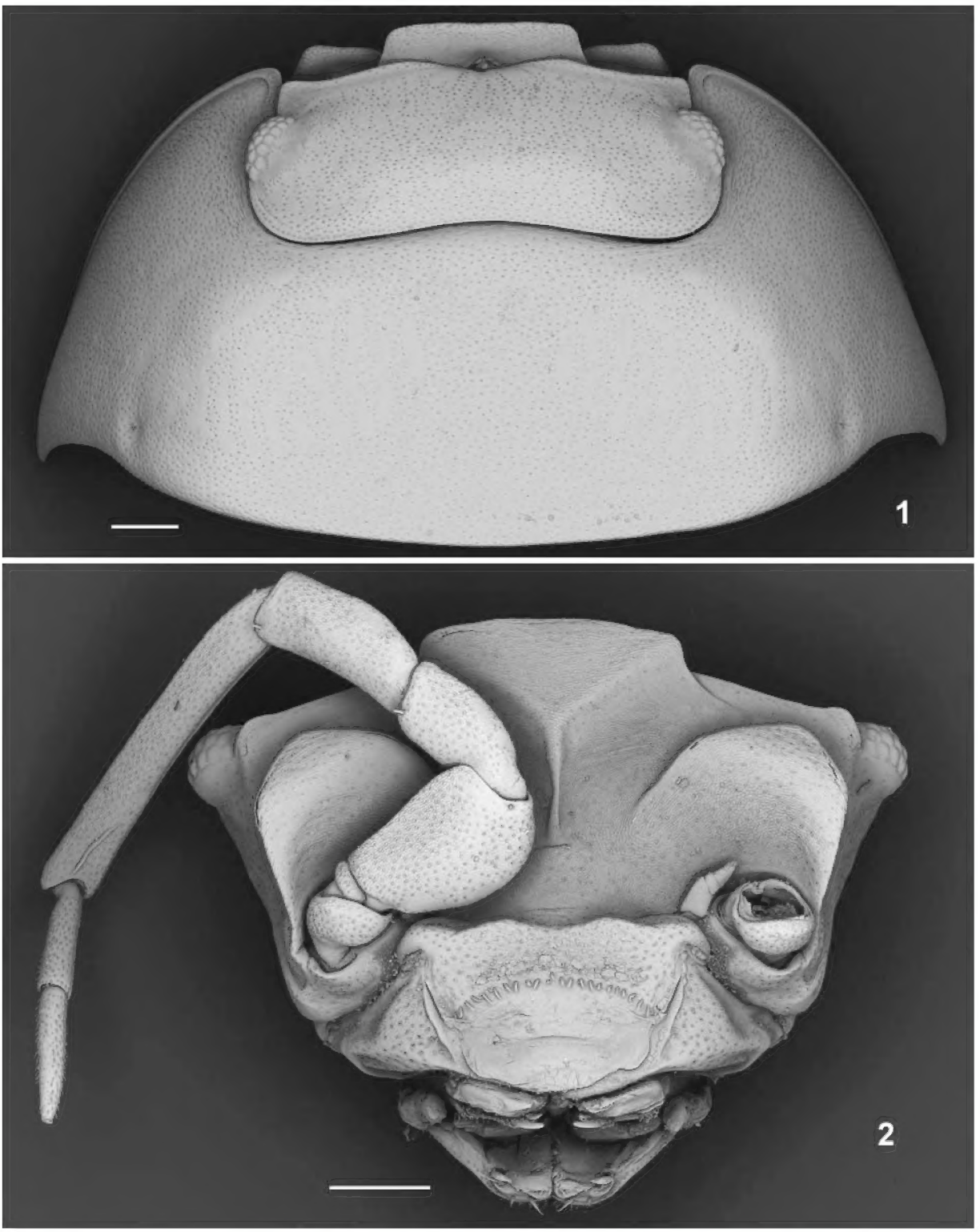
Literature records

Brandt 1833: 185 ("Italia et Dalmatia"); Koch 1841: 28.4, 28.5, 28.6 (*Armadillo astriger*, *guttatus*, *pustulatus*, "Dalmatien"); Stein 1859: 266 (Croatia: Ragusa = Dubrovnik); Vogl 1876: 511, figs. 4 a–d (*A. guttatum*, "Dalmatien"); Budde-Lund 1885: 56 ("Dalmatia"); Verhoeff 1901: 37 (*A. albanicum*, Albania, Aulona (= Vlorë); Greece: Ionian island Korfu (= Kérkira); Verhoeff 1902: 245 (*A. albanicum*), 248 (*A. klugii*); Verhoeff 1907: 468, 490 (*A. inflatum*, Greece: "Epirus"), 487, 498 (*A. klugii* and *A. klugii schumanum*, Hercegovina: "Schuma"); Rogenhofer 1908: 121 (*A. klugii* and *A. astriger*, southern Croatia: Clissa = Klis 5 km NE of Split; island Bua = Čiovo W of Split; peninsula Pelješac, Monte Vipera = mountain Sveti Ilija); Rogenhofer 1915: 337 (southern Croatia: isola Cazza = island Sušac 20 km W of island Lastovo); Arcangeli 1926: 10 (Montenegro: "Crszsatz", could not be localized); Strouhal 1927: 15 (*A. albanicum*, Greece: Ionian island Korfu = Kérkira); 27 (*A. klugii*: southern Croatia: "Monte Marian" near Split; island Šolta S of Split; Brazza = island Brač; Curzola (= island Korčula); Metković; Ragusa and Lapad (= surroundings of Dubrovnik); Hercegovina: Livno; Mostar; Gacko; Trebinje; Montenegro: Castelnuovo = Herceg Novi; Orjen Mountains); 30 (*A. cetinjense*: Montenegro: Cetinje); Strouhal 1928: 198, 202 (*A. klugii*: Croatia: island Pašman S of Zadar; Dubrovnik; Montenegro: Kotor; *A. cetinjense*); Arcangeli 1932: 79 (Albania: road Vorë–Scutari = Shkodër, near Milot); Strouhal 1936: 92, fig. 13 (*A. albanicum*, Greece: Ionian island Korfu = Kérkira); Strouhal 1937a: 47 (*A. albanicum*, Greece: Ionian island Korfu = Kérkira); Strouhal 1937b: 233 (*A. albanicum*); Strouhal 1939: 35 (*A. cetinjense*, southern Montenegro); Frankenberger 1941: 8, fig. 21; Vandel 1946: 181, figs. 33–34 (southern Hercegovina and southern Montenegro); Arcangeli 1952: 8 (*A. albanicum*, Albania: near Valona = Vlorë); Levi 1965: 261 (Croatia: Dubrovnik); Karaman 1966: 394; Strouhal 1966: 293 (*A. albanicum*); Lueken 1971: 1 ff (Montenegro: "Lovcen" = Lovčen pass); Schmalfuss 1981: 277, figs. 1–7 (*A. albanicum*); Schmalfuss 2010: 2, figs. 2–12 (*A. albanicum*, Greece: Ionian island Kerkira; province Epirus, prefecture Ioánnina).

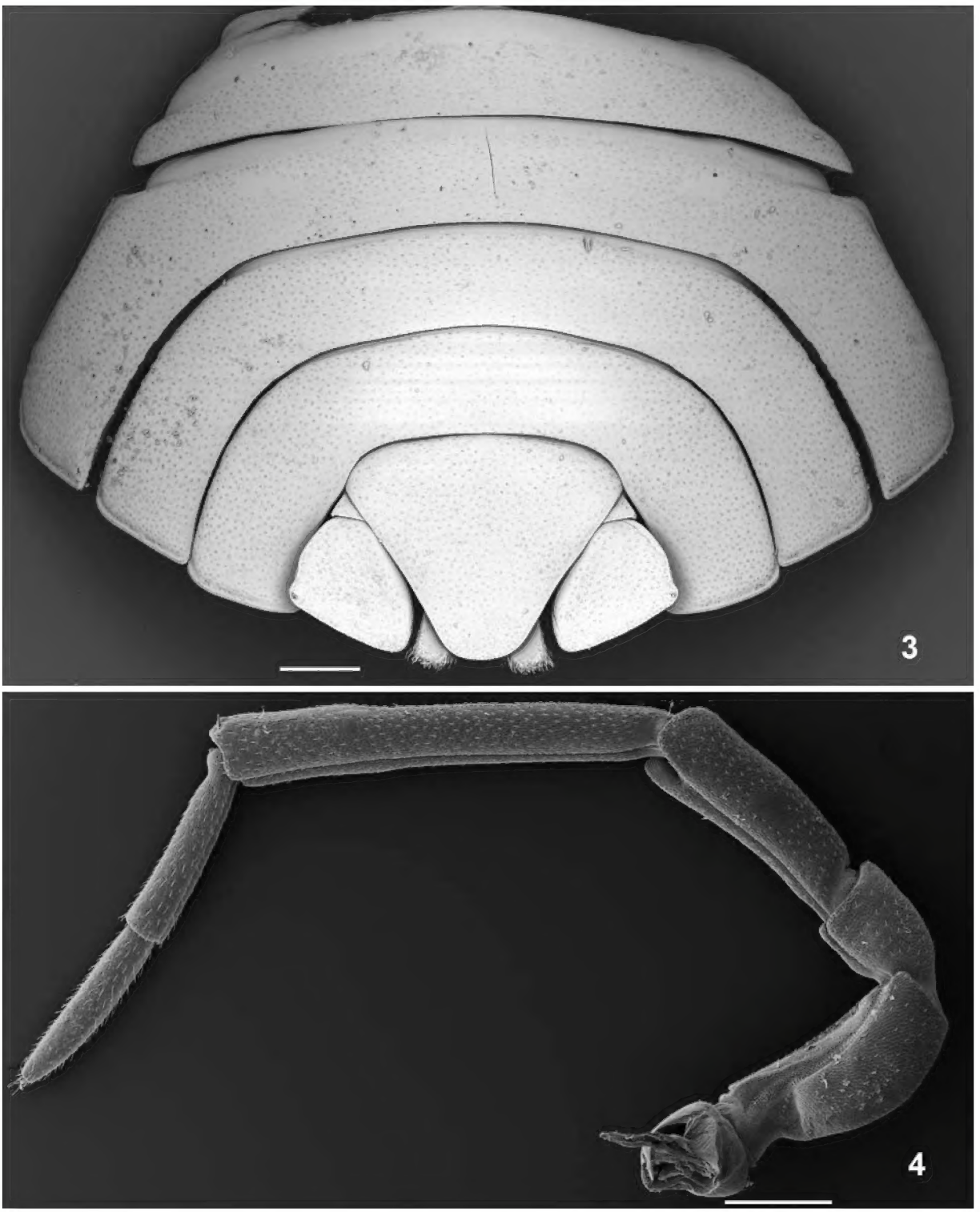
Vandel (1967: 340) reports two females of *A. klugii* from two localities in Bulgaria. Since females cannot be safely identified, and since Bulgaria is well outside the known distribution area of *A. klugii*, these records are probably a misidentification of *A. bulgaricum* (see Introduction).

Material examined

♂, lectotype, herewith designated to fix species identity, 14.4 × 7.4 mm (formerly dried and pinned), "Patria: Italia et Dalmatia" (Brandt 1833: 185, MNB). – 3 ♀♀, paralectotypes, same data as lectotype (Brandt 1833: 185, MNB). – 1 ♂, 1 ♀, "Dalmatien", leg. Walser, 1862 (SMNS 5065). – 6 ♂♂, 2 ♀♀, "Dalmatien", leg. Verhoeff, 1901 (SMNS 5064). – 2 ♂♂ (lectotype and paralectotype of *A. albanicum*), northwestern Greece, Ionian island Korfu = Kérkira, leg. Verhoeff, ?1901 (Verhoeff 1901: 37, SMNS T37 and T39). – 1 ♂ (paralectotype of *A. albanicum*), Albania: Aulona = Vlorë, leg. von Oertzen, III.1887 (Verhoeff 1901: 38, BMNH). – 1 ♂ (holotype of *A. inflatum*), northwestern Greece, "Epirus" without any detailed data (Verhoeff 1907: 490, ZSM). – 6 ♂♂, 4 ♀♀, 1 micropreparation, syntypes of *A. cetinjense*, Montenegro, Cetinje, leg. Rolle, 1898 (Strouhal 1927: 30, NMW). – 1 ♂, 1 ♀, southern Croatia, Split, leg. Grimm, III.1973 (SMNS 5040). – 4 ♂♂, 1 ♀, southern Croatia, Imotski, Modro Jezero, 370 m, macchia vegetation, leg. Kontschan & al., 6.X.2008 (SMNS 5097). – 4 ♂♂, 8 ♀♀, southern Croatia, Ploče, mouth of Neretva river, leg. Schmalfuss, 26.V.1969 (SMNS 5000), leg. Rieger, 19.VII.1970 (SMNS 5016) and leg. Deeleman, 16.IV.1976 (SMNS 5179). – 10 ♂♂, 15 ♀♀, southern Croatia, island Hvar, leg. Schmalfuss, VIII.1985 (SMNS 5092). – 3 ♂♂, 1 ♀, southern Hercegovina, "Schuma", leg. Verhoeff, 1901 (SMNS 5061, syntypes of *A. klugii schumanum* Verhoeff, 1907). – 1 ♂, 1 ♀, southern Hercegovina, Nevesinje, Kitino Selo, leg. Deeleman, 22.VII.1963 (SMNS 5183). – 1 ♀, southern Hercegovina, Nevesinje, Berkovići, leg. Deeleman, 25.VII.1963 (SMNS 5184). – 1 ♂, 1 ♀, southern Hercegovina, Čapljina, leg. Deeleman, 17.VII.1970 (SMNS 5220). – 1 ♀, southern Hercegovina, Bileća, leg. Deeleman, 11.VIII.1968 (SMNS 5298). – 2 ♂♂, 4 ♀♀, southern Hercegovina, Zavala, leg. Deeleman, 3.VII.1976 (SMNS 5299). – 1 ♂, 2 ♀♀, southwestern Montenegro, Velimlje, leg. Deeleman, 26.VII.1970 (SMNS 5182). – 3 ♂♂, 1 ♀, Montenegro, Krivošije Mountains N of Herceg Novi, Mokrine, 560 m, open macchia wood, leg. Kontschan & al., 7.X.2008 (SMNS 5108). – 2 ♂♂, 3 ♀♀, Montenegro, Risan ± 15 km NW of Kotor, 20 m, "shore ruderalia", leg. Kontschan & al., 8.X.2008 (SMNS 5152). – 1 ♀, 2 juv., Montenegro, Kotor, leg. Haas, 21.VIII.1971 (SMNS 5044). – 3 ♂♂, 3 ♀♀, Montenegro, E of Kotor, Lovčen pass, leg. Burmeister & Haas, 29.V.1973 (SMNS 5035, 5036). – 4 ♂♂, 1 ♀, Montenegro, Petrovac W of Virpazar, leg. Pieper & Runze, 9.X.1978 (SMNS 5047). – 1 ♀, Montenegro, Budva, leg. ?, 1978 (SMNS 5047). – 7 ♂♂, 9 ♀♀, Montenegro, Virpazar, leg.

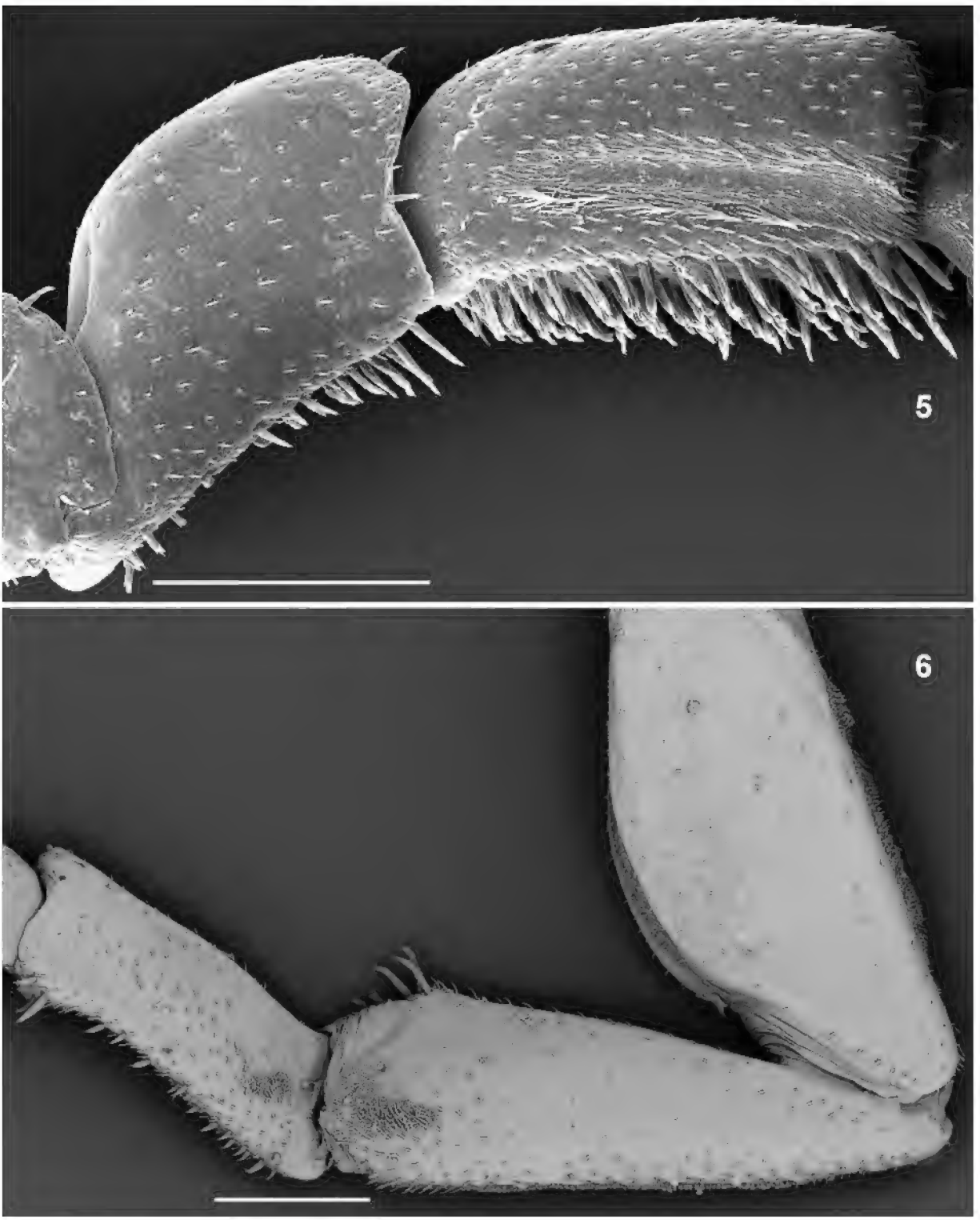


Figs. 1–2. *Armadillidium klugii* (Lovčen-Pass, SMNS 5035). – **1**. ♂, 17.0 × 7.6 mm, head and pereion-tergite 1, dorsal view. **2**. ♀, 16.5 × 7.3 mm, head, frontal view. – Scales: 0.5 mm.

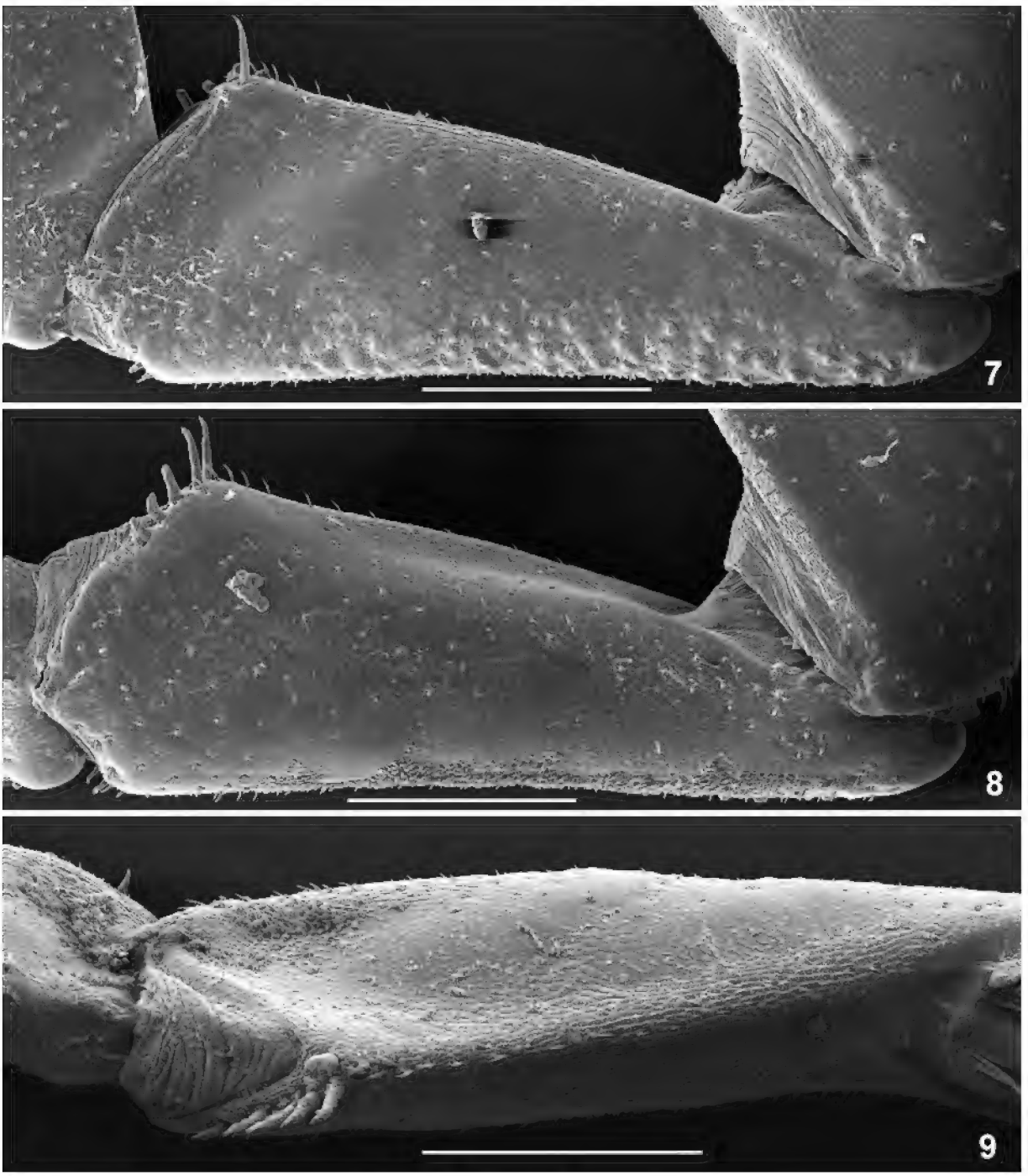


Figs. 3–4. *Armadillidium klugii* (Lovčen-Pass, SMNS 5035). – **3**. ♀, 17.0 × 7.7 mm, pleon, dorsal view. **4**. ♀, 16.5 × 7.3 mm, antenna. – Scales: 0.5 mm.

Miksch, 23.IX.1990 (SMNS 5055). – 1 ♂, Montenegro, 9 km S of Virpazar, leg. Kontschan & al., 14.X.2008 (SMNS 5096). – 1 ♂, 5 ♀♀, Montenegro, Skadarsko jezero (= Lake of Skutari), Livari, leg. Miksch, 23.IX.1990 (SMNS 5056). – 7 ♂♂, 4 ♀♀, Montenegro, Rumija Mountains, Stari Bar, 180 m, macchia vegetation, leg. Kontschan & al., 14.X.2008 (SMNS 5185).



Figs. 5–6. *Armadillidium klugii* (Lovčen-Pass, SMNS 5035), ♂, 17.0 × 7.6 mm. – **5**. Pereiopod 1, frontal view. **6**. Pereiopod 7, frontal view. – Scales: 0.5 mm.

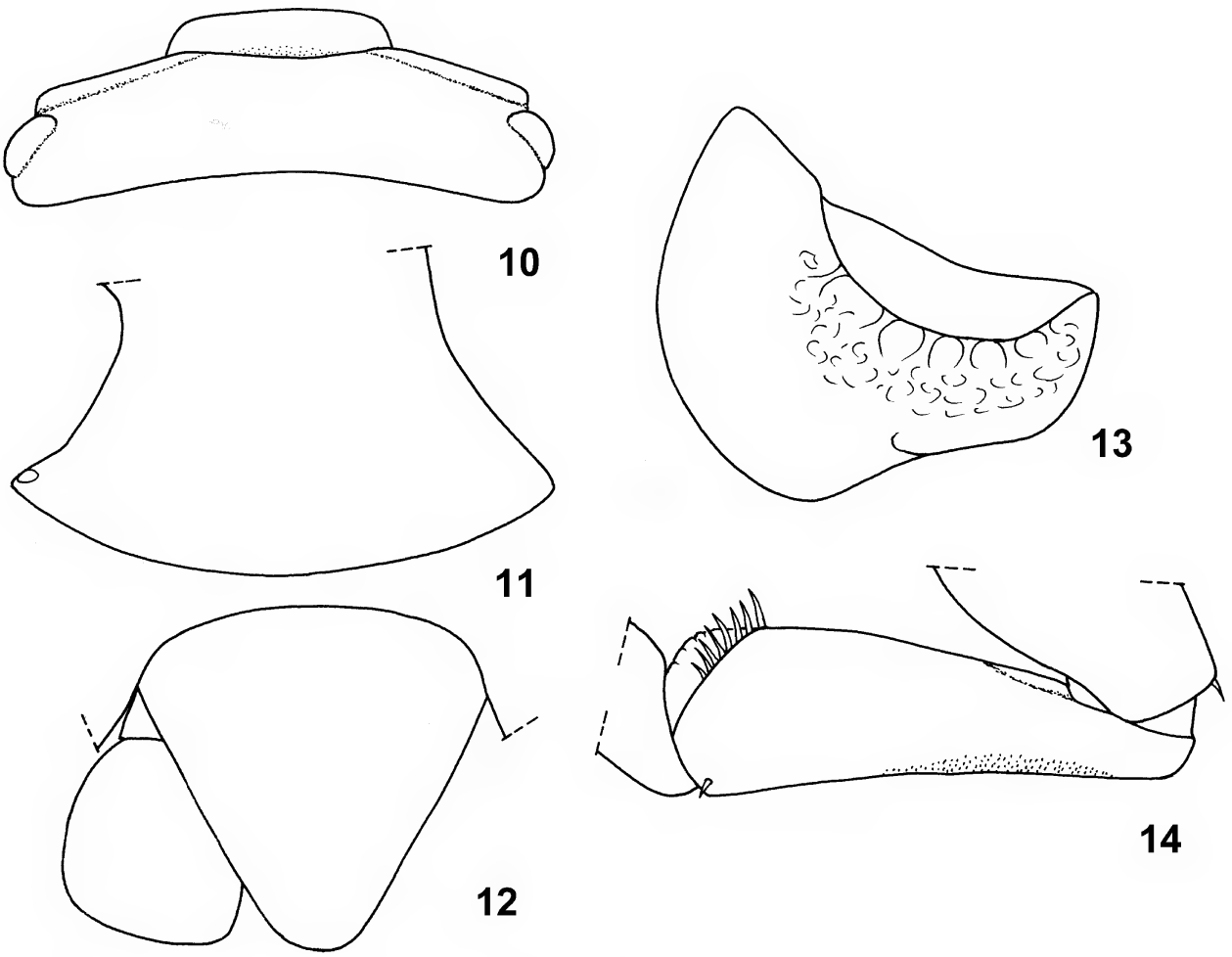


Figs. 7–9. *Armadillidium klugii* (Lovčen-Pass, SMNS 5035), ♂, 17.0 × 7.6 mm. – **7**. Ischium 7, frontal view. **8**. Ischium 7, caudal view. **9**. Ischium 7, lateral view. – Scales: 0.5 mm.

Diagnostic characters

Maximum dimensions: 21.0 × 9.3 mm.

Coloration: Variable. The most frequent variety has grayish brown dorsal parts, with 3 yellow patches on the pereion-tergites and a variable number on the pleon-tergites, and with yellow epimera and telson (for functional aspects see Remarks). There are specimens with a much lighter ground color, and there are a good proportion of specimens in which the epimera and the telson are not yellow, but dark.



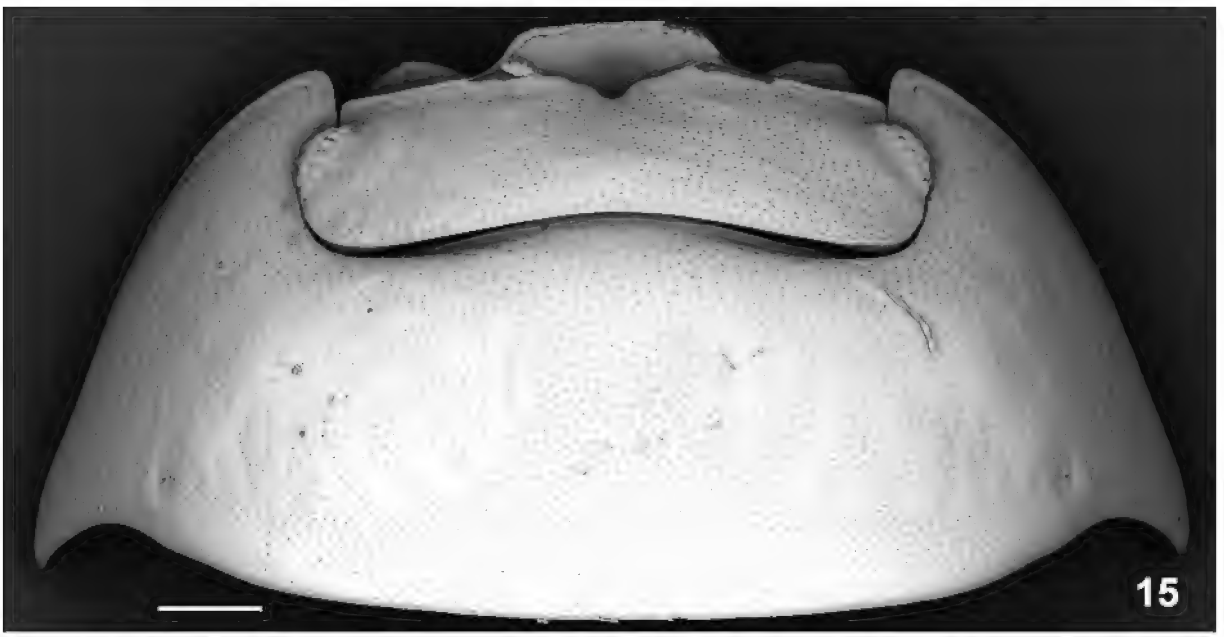
Figs. 10–14. *Armadillidium klugii* (MNB), lectotype ♂, 14.4 × 7.4 mm. – **10**. Head in dorsal view. **11**. Pereion-epimeron, lateral view. **12**. Telson and uropod in situ, dorsal view. **13**. Pleopod-exopodite 1, caudal view. **14**. Ischium 7, caudal view.

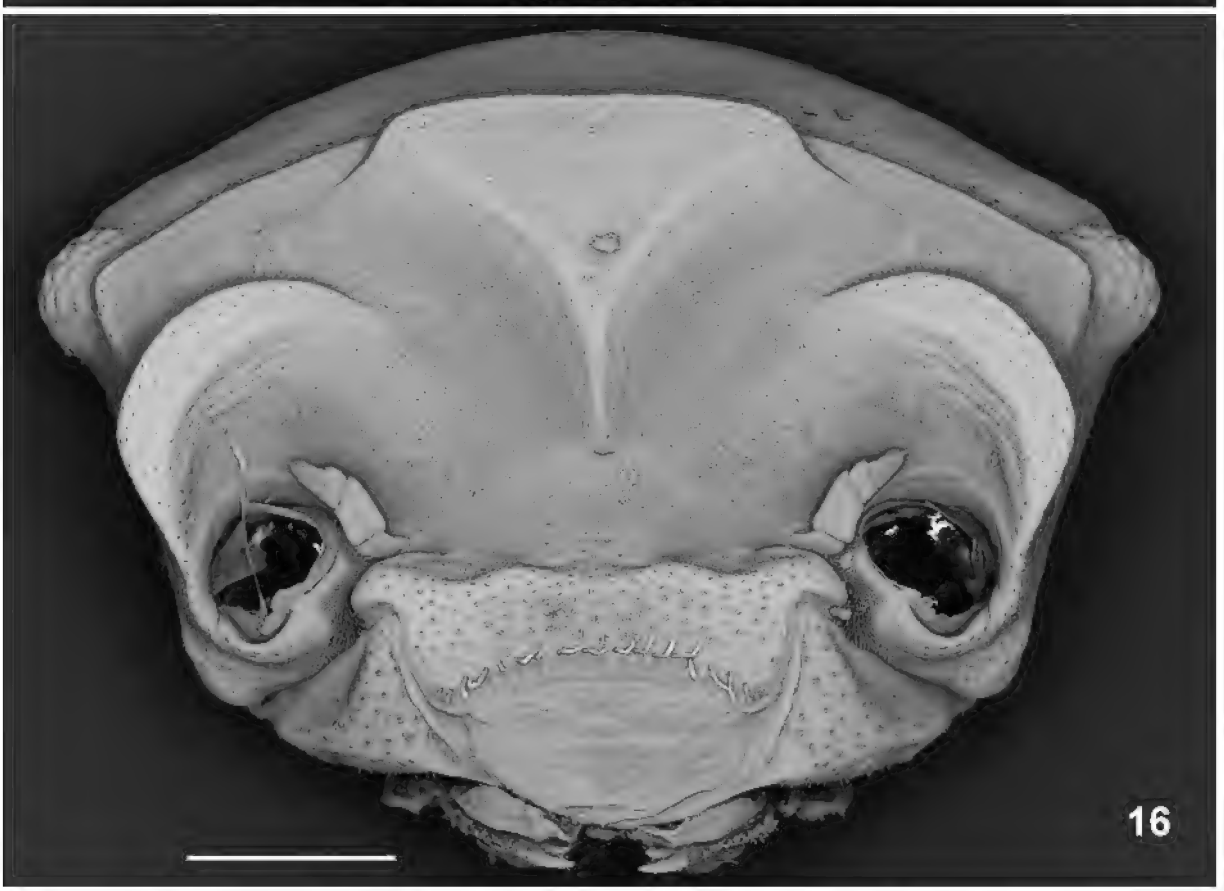
Cuticular structures: Tergites smooth, in the southern populations (*A.* "*albanicum*") with slight granulation (compare Fig. 1 with fig. 2 in Schmalfuss 2010).

Frontal shield from behind clearly surpassing frontal margin in a variable degree, upper margin slightly curved, lateral corners rounded or angled, with more or less conspicuous groove caudally (Figs. 1 and 10, fig. 3 in Schmalfuss 2010); antennal lobes trapezoidal to semicircular (Fig. 2; fig. 4 in Schmalfuss 2010). Hind margin of pereion-epimeron 1 rounded or with more or less pronounced angle (Fig. 11; fig. 9 in Schmalfuss 2010). Telson from slightly wider than long to slightly longer than wide, with straight sides and broadly rounded apex (Figs. 3 and 12; fig. 10 in Schmalfuss 2010). Flagellum of antenna in adults with the two segments of about the same length (Fig. 4; fig. 5 in Schmalfuss 2010). Male carpus 1 (but not merus 1) with well developed ventral brush of spiny setae (Fig. 5; fig. 6 in Schmalfuss 2010). Male ischium 7 ventrally straight or very slightly concave, frontal side with more or less well developed distal hair-field and in the proximal part always with knobs on the ventral side, caudally on ventral side with scaly structure (Figs. 6–9, 14; figs. 7 and 8 in Schmalfuss 2010). Male pleopod-exopodite 1 with variable triangular hind-lobe (Fig. 13; fig. 11 in Schmalfuss 2010), endopodite 1 with slender apex slightly bent outwards.

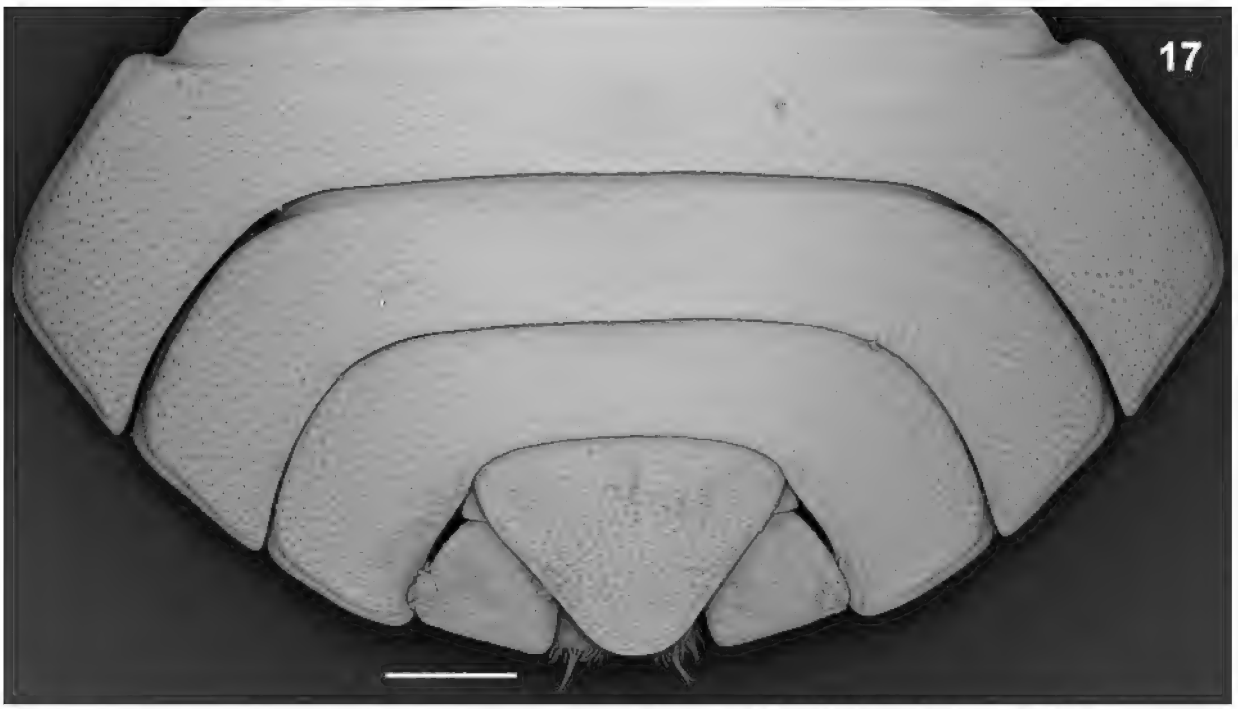
Distribution (map Fig. 21)

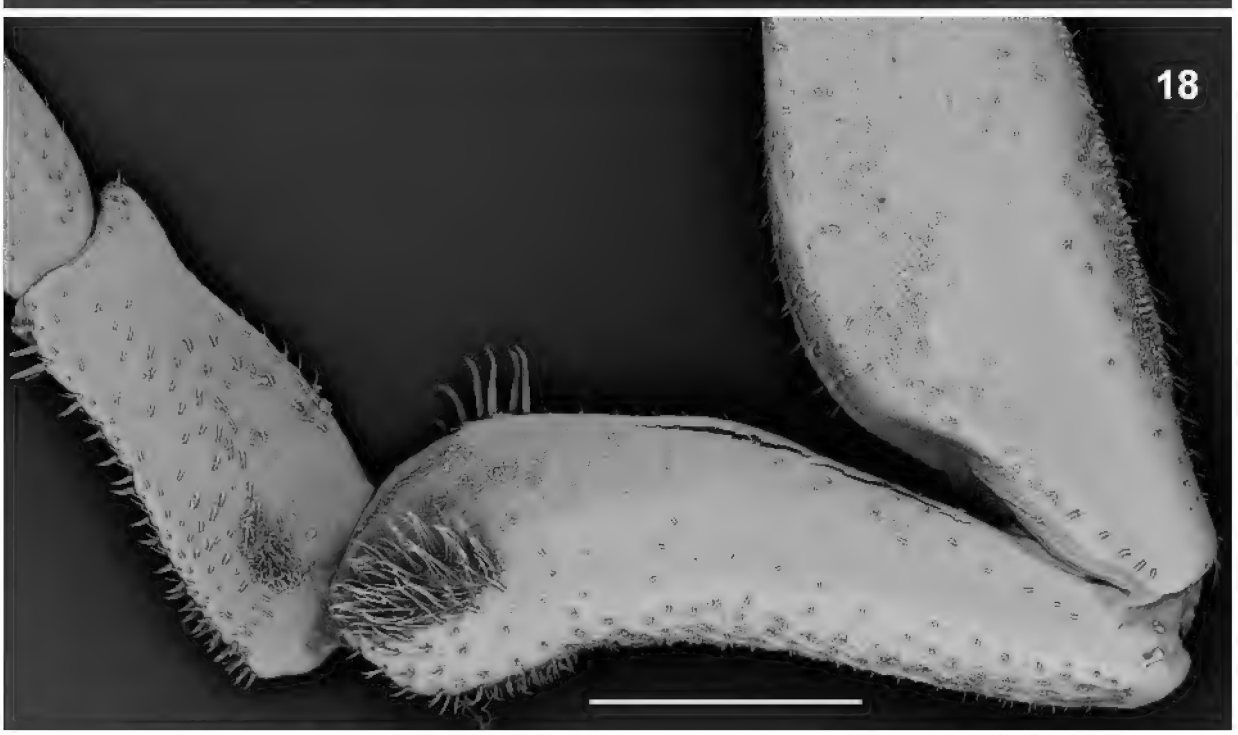
From the Dalmatian island Pašman (Croatia, S of Zadar, 44°00'N) to the Ionian Island Kérkira (Greece, 39°30'N) and on the adjacent mainland.





Figs. 15–16. *Armadillidium flavoscutatum* (Albania, Kurbnesh, SMNS 5543). – **15**. ♂, 13.2 × 6.3 mm, head and pereion-tergite 1, dorsal view. **16**. ♀, 12.2 × 5.5 mm, head in frontal view. – Scales: 0.5 mm.

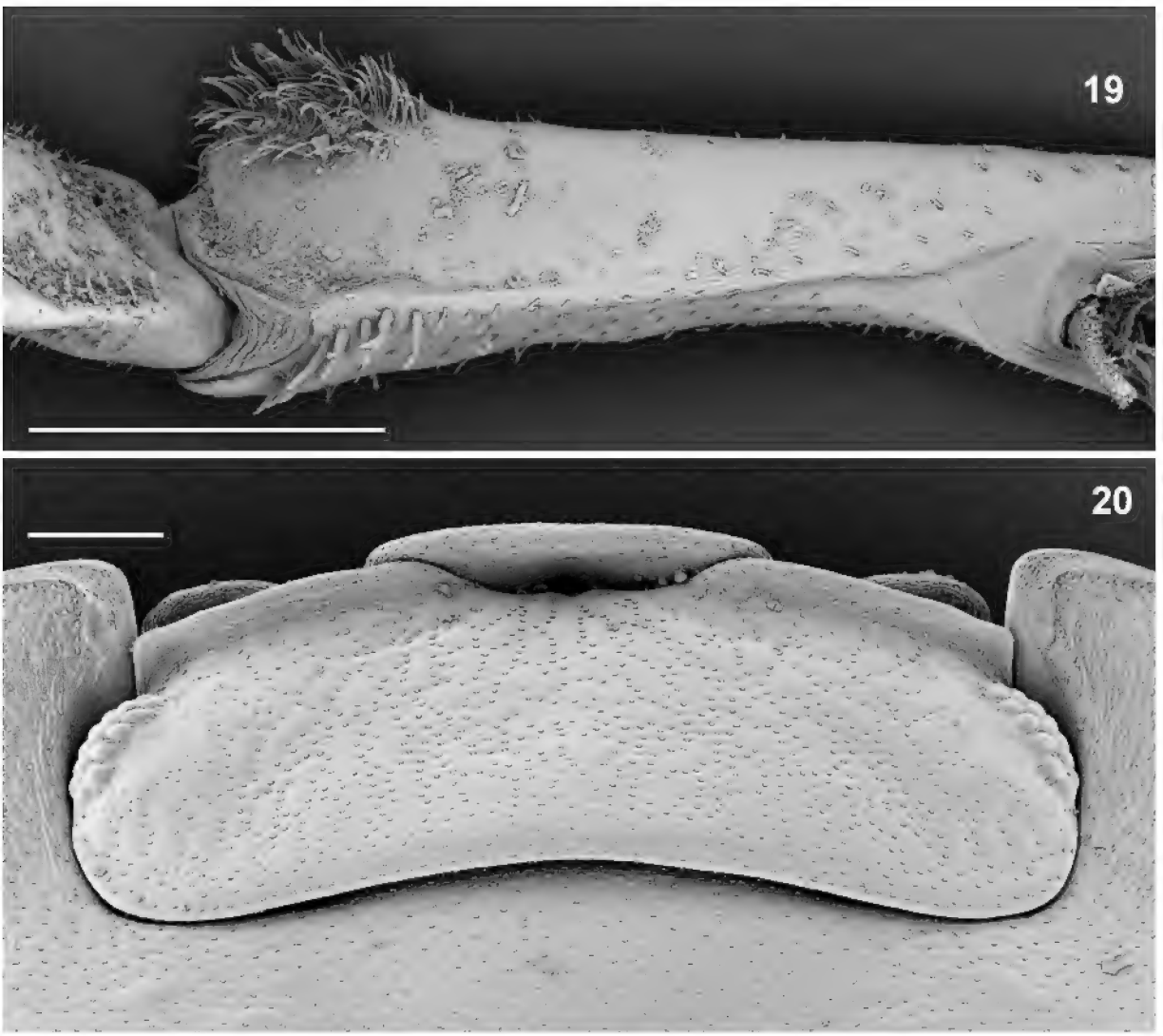




Figs. 17–18. *Armadillidium flavoscutatum* (Albania, Kurbnesh, SMNS 5543). – **17**. ♀, 12.2 × 5.5 mm, pleon in dorsal view. **18**. ♂, 13.2 × 6.3 mm, pereiopod 7, frontal view. – Scales: 0.5 mm.

Remarks

The investigation of a copious material of this species (see Material examined) revealed a certain variability in the shape of the frontal shield, the hind margin of pereion-epimeron 1, the telson, the male pleopod-exopodite 1, and to a certain degree also in the distribution of the cuticular structures of the male ischium 7. In the light of this variability a reexamination of the type-specimens of *A. klugii*, *A. albanicum*, *A. inflatum* and *A. cetinjense* led to the conclusion that the latter three taxa have to be considered as



Figs. 19–20. *Armadillidium* spp. – **19**. *A. flavoscutatum* (Albania, Kurbnesh, SMNS 5543), ♂, 13.2 × 6.3 mm, ischium 7, lateral view. **20**. *A. werneri* (Greek Ionian island Kérkira, SMNS 2788), ♂, 16.0 × 7.8 mm, head, dorsal view. – Scales: 0.5 mm.

junior synonyms of *A. klugii*. In the redescription of *A. inflatum* (Schmalfuss 1981: 284, fig. 51 and 2010: 21, fig. 55) the telson was depicted in an oblique position, showing a width : length relation of 6.0 : 4.6; the real width : length relation is, however, 6.0 : 5.3, which lies inside the variability scale of *A. klugii*.

Two more species found inside the distribution area of *A. klugii* are very similar to the latter species; *A. werneri* Strouhal, 1927 and *A. flavoscutatum* Strouhal, 1927. They show, however, consistent morphological differences towards *A. klugii*, so they are treated as different species (see below).

Levi (1965: 261) developed the hypothesis that *A. klugii* with its conspicuous coloration pattern mimics the black widow spider *Latrodectus*. This spider has similar bright yellow-orange spots on its black abdomen, signaling to potential predators the possibility to be seriously poisoned. The author excludes small mammals as addressees of this warning coloration because of their nocturnal activity pattern. Instead he suggests that lizards might be the predators at which this coloration is addressed. In the literature there are reports that *Latrodectus* is poisonous, but not lethal, to lizards, which thus may learn to avoid the spider as prey. One contradiction to the lizard hypothesis would, however, be the fact that *Latrodectus*, *Armadillidium* and the glomerid diplopod with a similar color pattern are all nocturnal, so an encounter between diurnal lizards and the mentioned arthropods is highly improbable. On the other hand the conspicuous color pattern of these animals should also be visible in the night, if this is not completely dark, which is

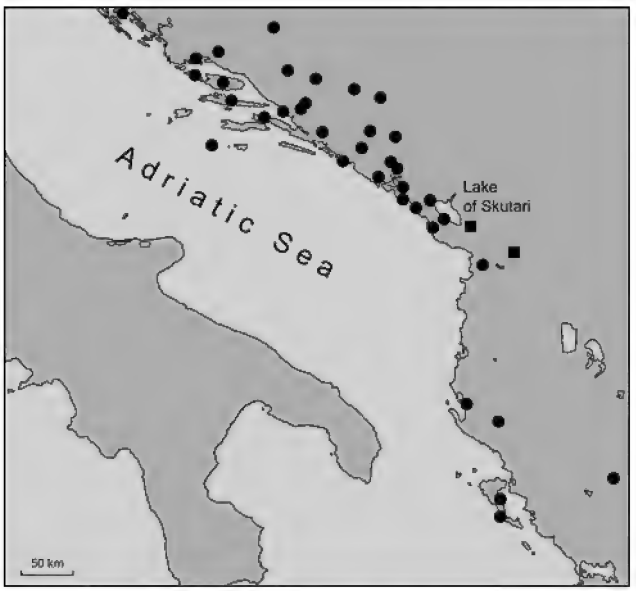


Fig. 21. Records of *Armadillidium klugii* (●) and *A. flavoscutatum* (■).

rarely the case in a cloudless Mediterranean summer. So more probably nocturnal mammals and/or nocturnal reptiles as geckos may be the target group of this mimicry system. Additionally ground-feeding birds that turn over leaves and other debris, as thrushes and gallinaceous birds, may also be involved, as they uncover nocturnal arthropods by this behavior.

This *Latrodectus* hypothesis is one possibility for a functional explanation of the color pattern of this group of *Armadillidium* species. Of course, there may be a number of alternative hypotheses, so experiments with live animals would be necessary to substantiate one of these explanations.

2.2 *Armadillidium flavoscutatum* Strouhal, 1927 (Figs. 15–19, map Fig. 21)

Literature records

Strouhal 1927: 28, figs. 28–32 (Albania: "bei Skutari… Kiri-Brücke nächst Mesi" = 5 km NE of Shkodër; "Berg Maranaj, 1576 m").

This species has only been found in Albania, not in Montenegro, as claimed by Karaman (1966).

Material examined

5 ♂♂, 5 ♀♀, 1 micropreparation, syntypes, Albania: "bei Skutari…Kiri-Brücke nächst Mesi" = 5 km NE of Shkodër, leg. ?, 27.IV.1905 (Strouhal 1927: 28, NMW). – 3 ♂♂, 1 ♀, northern Albania, Kurbnesh, 40 km E of Lezhë, 800 m, leg. Eröss & al., 27.VI.2003 (SMNS 5543).

Diagnostic characters

Maximum dimensions: 15.0 × 6.5 mm (♀ with marsupium 12.2 × 5.5 mm).

Coloration: Variable. In the investigated syntypes the head and the first pereion-tergite are yellow, the other tergal parts black. The specimens from Kurbnesh show the same color pattern as *A. klugii*, with three rows of yellow spots on the tergites and yellow epimera.

Cuticular structures: Tergites smooth.

Frontal shield from behind clearly surpassing frontal margin, narrower than in *A. klugii*, lateral corners rounded, with conspicuous groove caudally (Fig. 15); antennal lobes rounded (Fig. 16). Hind margin of pereion-epimeron 1 rounded. Telson wider than long, shorter than in *A. klugii*, with straight sides and broadly rounded apex (Fig. 17). Antenna and male pereiopod 1 as in *A. klugii*. Male pereiopod 7 conspicuously different from *A. klugii*, ischium ventrally distinctly concave, frontal side with a distal knob and a well developed distal hair-field, merus proximally wider than in distal part and with small hair-field on proximal part (Figs. 18, 19). Male pleopod 1 as in *A. klugii*.

Distribution (map Fig. 21)

Known only from northern Albania. The two records of this species lie inside the distribution area of *A. klugii*. Further collections are necessary to clarify the distributional situation.

Remarks

The species is very similar to *A. klugii* except for the conspicuously different structure of the male pereiopod 7, which pleads for the separation as a distinct species.

2.3 *Armadillidium werneri* Strouhal, 1927 (Fig. 20)

The species was redescribed and illustrated in Schmalfuss 2011: 41, figs. 94–102. It differs from *A. klugii* by frontal crests laterally of the frontal shield (see Fig. 20), a distinct angle on hind margin of pereion-epimeron 1 and a narrowly rounded apex of the telson. The species is known only from the Greek Ionian island Kérkira (= Corfu).

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The species of the genus *Armadillidium* (Isopoda: Oniscidea) known from Greece

Helmut Schmalfuss

Abstract

In the present paper the results of a revision of the Greek species of *Armadillidium* are summarized. This revision was published in six separate parts between 2006 and 2012. A list is presented of the 59 species that are considered as valid, with synonyms and distributional data. Additionally these species are ascribed to a number of distributional categories.

Keywords: Isopoda, Oniscidea, *Armadillidium*, Greece.

Zusammenfassung

Im vorliegenden Artikel werden die Ergebnisse einer Revision der griechischen *Armadillidium*-Arten zusammengefasst. Diese Revision wurde in sechs getrennten Teilen zwischen 2006 und 2012 publiziert. Die 59 als valide betrachteten Arten werden mit Synonymen und Verbreitungsangaben aufgelistet. Außerdem werden diese Arten einer Anzahl von Verbreitungskategorien zugeordnet.

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3 List of *Armadillidium* species known from Greece 14
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1 Introduction

The terrestrial isopod genus *Armadillidium* Brandt, 1831 has a radiation centre in the northeastern Mediterranean region, with an exceptionally high number of often very similar species in this area. In addition to the complicated taxonomical situation many species were described insufficiently in the first half of the 20th century. This led to the effect that many species were described more than once, and that in many cases safe identifications were impossible. To change this situation for the Greek species of *Armadillidium* an extensive revision of all species known from Greece was undertaken in six parts which were published between 2006 and 2012 (Schmalfuss 2006a, b; 2008; 2010–2012). 45 species described before 2006 and presently considered as valid were redescribed, in the many doubtful cases after type-material. All diagnostic characters were illustrated in a comparable way, and the majority of these illustrations are SEM-photographs. In addition to the described species extensive unpublished material was included in the revision, which was collected during the past 45 years by the author and many colleagues. Thus the descriptions of 14 new species have been included in this revision.

Acknowledgements

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2 The genus *Armadillidium*

The genus *Armadillidium* was instituted by Brandt in Brandt & Ratzeburg (1831: 81). *A. commutatum*, which is a synonym of *A. vulgare*, was designated as type species by Fowler (1912: 225). Today 189 taxa are considered as valid species. *Armadillidium* is a really Mediterranean genus, with an autochthonous distribution in Europe, northern Africa and western Asia (see map Fig. 1).

Definition of *Armadillidium*:

1. Ability to roll up into a closed ball, which may have a lemon-like shape.
2. Lungs with multiple spiracles in 1st and 2nd pleopod-exopodite.
3. Uropod-exopodite flattened and truncated, filling the space between epimeron of pleonite 5 and telson.
4. Frontal part of head with a triangular shield (which seems to be a modified supra-antennal line) reaching

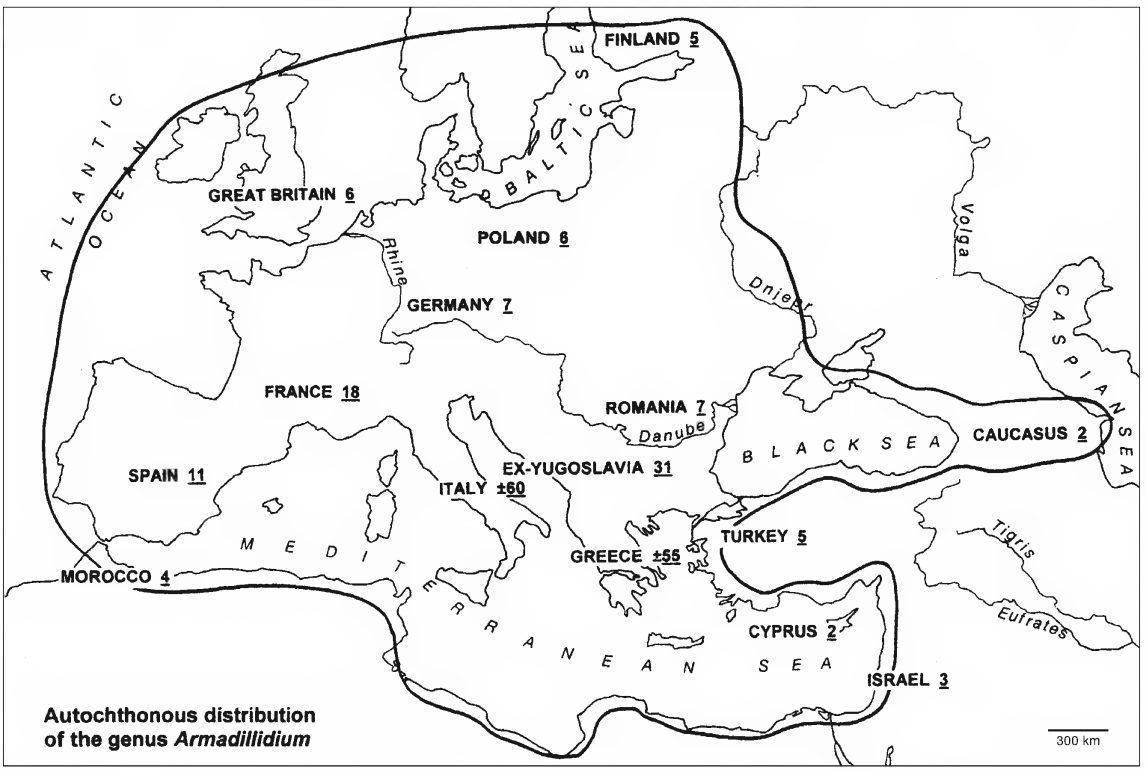

Fig. 1. Autochthonous distribution of the genus *Armadillidium* (from SCHMALFUSS 2000).

the level of the upper head surface or surpassing this level.

5. Lateral parts of inter-ocular line present.

Considering the morphological arguments the family Armadillidiidae seems to be a monophyletic taxon, while the genus *Armadillidium*, according to the definition specified above, may well be paraphyletic. Sophisticated molecular investigations are necessary to reach safer phylogenetic conclusions. The same holds true for the phylogenetic relations inside the genus, as the morphological characters are all rather prone to convergence and the evidence is often ambiguous. The only group of the Greek species that may be a monophyletic branch on morphological grounds is the *nasatum*-group with the species *A. grimmi*, *pallasii* and *peraccae*, characterized by the elongated frontal triangle which surpasses the upper head surface considerably, and correspondingly an elongated narrow telson.

3 List of *Armadillidium* species known from Greece

In bold type: presently considered as valid species.

***Armadillidium aegaeum* Strouhal, 1929**
Redescription: SCHMALFUSS (2006b).
Greek records: Northern Sporades and Évvia (map see SCHMALFUSS 2006b: fig. 19).
Distribution: The Greek islands mentioned above.

Armadillidium aeginense Strouhal, 1939 = ***A. argolicum***.

Armadillidium albanicum Verhoeff, 1901 = ***A. klugii***.

***Armadillidium album* Dollfus, 1887**
Redescription: SCHMALFUSS (2008).
Greek records: Coast of northern Aegean Sea and Ionian island Zákinthos (map see SCHMALFUSS 2008: fig. 13).
Distribution: Known from the coasts of the European Atlantic north to England and the Netherlands (including Madeira) and from the northern and southwestern coasts of the Mediterranean.

***Armadillidium ameglioi* Arcangeli, 1914**
Synonyms: *A. ephesiacum* Strouhal, 1929 (from coast of Asia Minor), *A. samium*.
Redescription: SCHMALFUSS (2006b).
Greek records: Aegean islands Khíos, Sámos, Alatsoníci, Náxos, Amorgós, Khálki, Símí, Ródos and the island of Kastelórizo 130 km E of Ródos (map see SCHMALFUSS 2006b: fig. 19).
Distribution: Known from the southeastern Aegean islands mentioned above and from the coast of southeastern Asia Minor (map of overall distribution in SCHMALFUSS 2000: fig. 7).

***Armadillidium arcadicum* Verhoeff, 1902**
Synonyms: *A. humile*, ?*A. zuellichi*.
Redescription: SCHMALFUSS (2006a).
Greek records: Ionian islands Kefaloniá and Zákinthos, western, central and southern parts of the Peloponnese (map see SCHMALFUSS 2006a: fig. 22).

Distribution: Known only from the Greek regions mentioned above.

***Armadillidium argolicum* Verhoeff, 1907**
Synonyms: *A. hydrense*, *A. mycenaeum*, *A. aeginense*.
Redescription: SCHMALFUSS (2006a).
Greek records: Northeastern Peloponnese including adjacent islands (map see SCHMALFUSS 2006a: fig. 22, additional record see SCHMALFUSS 2006b).
Distribution: Known only from the Greek regions mentioned above.

***Armadillidium artense* Strouhal, 1956**
Redescription: SCHMALFUSS (2010).
Greek records: Western mainland, surroundings of Árta (map see SCHMALFUSS 2010: fig. 12).
Distribution: Western Greek mainland.

Armadillidium astriger (C. Koch, 1841) = nomen dubium.

***Armadillidium atticum* Strouhal, 1929**
Redescription: SCHMALFUSS (2006b).
Greek records: Central mainland (Attica) and Aegean islands Évvia, Salamína, Égina and Kíthnos (map see SCHMALFUSS 2006b: fig. 48).
Distribution: Central Greece.

***Armadillidium beieri* Strouhal, 1937**
Redescription: SCHMALFUSS (2011).
Greek records: Ionian islands Lefkáda, Kálamos and Kefaloniá (map see SCHMALFUSS 2011: fig. 15).
Distribution: Greek Ionian islands.

***Armadillidium bensei* Schmalfuss, 2006**
Description: SCHMALFUSS (2006a).
Greek records: Northern Peloponnese (map see SCHMALFUSS 2006a: fig. 22, unpublished specimens recorded from 40 km east of type locality, SMNS 1632, 1777).
Distribution: Greece, northern Peloponnese.

***Armadillidium bicurvatum* Verhoeff, 1901**
Synonym: *A. schulzi*.
Redescription: SCHMALFUSS (2006a).
Greek records: Western and central parts of Greece from Epirus and island Kérkira (= Corfu) to western Crete (map see SCHMALFUSS 2006a: fig. 51).
Distribution: Southern Albania, western Greek mainland and northern Ionian islands, Peloponnese and western Crete.

Armadillidium bimarginatum Strouhal, 1929 = ***A. peloponnesiacum***.

***Armadillidium cephalonicum* Strouhal, 1929**
Redescription: SCHMALFUSS (2011).
Greek records: Ionian islands Kefaloniá and Zákinthos (map see SCHMALFUSS 2011: fig. 25).
Distribution: Greece, southern Ionian islands.

Armadillidium clausi Verhoeff, 1901 = nomen dubium.

***Armadillidium corcyraeum* Verhoeff, 1901 (Fig. 2)**
Synonyms: *A. graecorum*, *A. odysseum*.
Redescription: SCHMALFUSS (2010).

Fig. 2. *Armadillidium corcyraeum*, NW-Greece, Igumenitsa.

Greek records: Ionian islands Kérkira, Paxí and Lefkáda and adjacent mainland of the western Epirus (map see SCHMALFUSS 2010: fig. 30).
Distribution: Greece, northern Ionian islands and adjacent mainland.

***Armadillidium cythereium* Strouhal, 1937**
Redescription: SCHMALFUSS (2006b).
Greek records: Island Kíthira S of southeastern Peloponnese, and smaller islands between Kíthira and western Crete (map see SCHMALFUSS 2006b: fig. 48).
Distribution: Greece, islands between southeastern Peloponnese and western Crete.

Armadillidium emmae Strouhal, 1937 = ***A. insulanum***.

***Armadillidium epiroticum* Strouhal, 1956**
Synonyms: *A. jonicum epiroticum*.
Redescription: SCHMALFUSS (2010).
Greek records: Western mainland, southernmost part of province Epirus (map see SCHMALFUSS 2010: fig. 40).
Distribution: Western Greek mainland.

Armadillidium epirense Strouhal, 1956 = ***A. janinense***.

***Armadillidium fossuligerum* Verhoeff, 1902**
Redescription: SCHMALFUSS (2012).
Greek records: Central mainland, mountains of the prefecture Evritanía, central mainland of Greece (map see SCHMALFUSS 2012: fig. 16). Other records given for this species in SCHMALFUSS (2008) are considered as different species (see SCHMALFUSS 2012).
Distribution: Central Greek mainland.

***Armadillidium frontemarginatum* Strouhal, 1927**
Redescription: SCHMALFUSS (2011).
Greek records: Ionian islands Lefkáda, Meganísi, Kálamos, Kefaloniá and Zákinthos (map see SCHMALFUSS 2011: fig. 36).
Distribution: Greek Ionian islands.

***Armadillidium frontetriangulum* Verhoeff, 1901**
Redescription: SCHMALFUSS (2010).
Greek records: Ionian island Kérkira and adjacent mainland of southern Epirus (map see SCHMALFUSS 2010: fig. 51).

Distribution: Greece, northern Ionian islands and adjacent mainland.

***Armadillidium gionum* Schmalfuss, 2012**
Description: Schmalfuss (2012).
Greek records: Southern mainland, prefecture Fokída, Gióna Mountains (map see Schmalfuss 2012: fig. 16).
Distribution: Southern Greek mainland.

Armadillidium globosum Vogl, 1876 = nomen dubium.

Armadillidium graecorum Verhoeff, 1907 = ***A. corcyraeum***.

***Armadillidium granulatum* Brandt, 1833**
Redescription: Schmalfuss (2006a).
Greek records: Ionian island Stamfáni (Strofádes) 50 km S of Zákinthos; southwestern peninsula of the Peloponnese; southern Aegean islands and island Lésvos (map see Schmalfuss 2006a: fig. 64).
Distribution: Coasts of the Mediterranean Sea east to Asia Minor and Libya; southwestern coast of the Black Sea; isolated records from the Atlantic coast of Portugal and northern France (map of overall distribution in Schmalfuss 2000: 78: fig. 3).

Armadillidium granulatum peloponnesiaca Verhoeff, 1901 = ***A. peloponnesiacum***.

***Armadillidium grimmi* Schmalfuss, 2006**
Description: Schmalfuss (2006a).
Greek records: Southeastern Peloponnese (map see Schmalfuss 2006a: fig. 75).
Distribution: Greece, southeastern Peloponnese.

***Armadillidium hauseni* Schmalfuss, 1985**
Redescription: Schmalfuss (2011).
Greek records: Ionian island Paxí (map see Schmalfuss 2011: fig. 36).
Distribution: Known only from the Greek Ionian island Paxí S of Kérkira.

Armadillidium holtzi Strouhal, 1929 = ***A. janinense***.

***Armadillidium humectum* Strouhal, 1937**
Redescription: Schmalfuss (2006a).
Greek records: Ionian islands Kérkira, Lefkáda and Zákinthos; southwestern mainland; northern Peloponnese (map see Schmalfuss 2006a: fig. 75).
Distribution: Western Greece.

Armadillidium humile Strouhal, 1936 = ***A. arcadicum***.

Armadillidium hydrense Strouhal, 1937 = ***A. argolicum***.

Armadillidium inflatum Verhoeff, 1907 = ***A. albanicum***.

***Armadillidium insulanum* Verhoeff, 1907**
Synonyms: *A. emmae*, *A. lemnium*, *A. samothracium*, *A. scyrium*.
Redescription: Schmalfuss (2006b).
Greek records: Northeastern mainland; northern and central Aegean islands (map see Schmalfuss 2006b: fig. 71).
Distribution: Coasts and islands of the northern and central Aegean Sea.

***Armadillidium irmengardis* Strouhal, 1956**
Redescription: Schmalfuss (2010).
Greek records: Western mainland, province Epirus, prefecture Ioánnina (map see Schmalfuss 2010: fig. 69).
Distribution: Western Greek mainland.

***Armadillidium janinense* Verhoeff, 1902**
Synonyms: *A. epirense*, *A. holtzi* (see Schmalfuss 2012).
Redescription: Schmalfuss (2008).
Greek records: Western mainland (map see Schmalfuss 2008: fig. 34).
Distribution: Western Greek mainland.

***Armadillidium jerrentrupi* Schmalfuss, 2008**
Description: Schmalfuss (2008).
Greek records: Northeastern mainland, lower Néstos river system (map see Schmalfuss 2008: fig. 47).
Distribution: Northeastern Greek mainland.

***Armadillidium jonicum* Strouhal, 1927**
Redescription: Schmalfuss (2011).
Greek records: Ionian islands Lefkáda, Kálamos, Itháki and Kefaloniá (map see Schmalfuss 2011: fig. 56).
Distribution: Central Greek Ionian islands.

Armadillidium jonicum epiroticum Strouhal, 1956 = ***A. epiroticum***.

***Armadillidium justi* Strouhal, 1937**
Redescription: Schmalfuss (2011).
Greek records: Ionian islands Lefkáda, Meganísi and Kálamos (map see Schmalfuss 2011: fig. 66).
Distribution: Central Greek Ionian islands.

***Armadillidium kalamatense* Verhoeff, 1907**
Redescription: Schmalfuss (2006a).
Greek records: Southern Peloponnese (map see Schmalfuss 2006a: fig. 96).
Distribution: Greece, southern Peloponnese.

***Armadillidium kalamium* Strouhal, 1956**
Redescription: Schmalfuss (2011).
Greek records: Ionian island Kálamos (map see Schmalfuss 2011: fig. 73).
Distribution: Only known from the central Greek Ionian island Kálamos.

***Armadillidium klugii* Brandt, 1833**
Synonyms: *A. albanicum*, *A. inflatum*.
Redescriptions: Schmalfuss (2010, *albanicum*; 2013, *klugii*).
Greek records: Ionian island Kérkira and northwestern mainland, province Epirus, prefecture Ioánnina (map see Schmalfuss 2010: fig. 12)
Distribution: Coasts and islands of northwestern Greece, Albania and Ex-Yugoslavia.

***Armadillidium kuehnelti* Schmalfuss, 2006**
Description: Schmalfuss (2006a).
Greek records: Northeastern Peloponnese (map see Schmalfuss 2006a: fig. 96).
Distribution: Greece, northeastern Peloponnese.

***Armadillidium laconicum* Strouhal, 1938**
Redescription: SCHMALFUSS (2006a).
Greek records: Southeastern Peloponnese (map see SCHMALFUSS 2006a: fig. 120).
Distribution: Greece, southeastern Peloponnese.

***Armadillidium laminigerum* Verhoeff, 1907**
Redescription: SCHMALFUSS (2012).
Greek records: Central mainland, prefecture Etolía Akarnanía (map see SCHMALFUSS 2012: fig. 34).
Distribution: Greece, central mainland.

Armadillidium lemnium Strouhal, 1937 = ***A. insulanum***.

***Armadillidium lobocurvum* Verhoeff, 1902**
Redescription: SCHMALFUSS (2006a).
Greek records: Central mainland, coastal region of prefecture Fokída, and northwestern Peloponnese (map see SCHMALFUSS 2006a: fig. 120).
Distribution: Greece, northwestern Peloponnese and adjacent coasts of central Greece.

Armadillidium luridum Verhoeff, 1907 = ***A. peloponnesiacum***.

***Armadillidium lymberakisi* Schmalfuss, Paragamian & Sfenthourakis, 2004**
Redescription: SCHMALFUSS (2006b).
Greek records: Western Crete, Lefká Óri region (map see SCHMALFUSS 2006b: fig. 83).
Distribution: Greece, western Crete.

***Armadillidium maniatum* Schmalfuss, 2006**
Description: SCHMALFUSS (2006a).
Greek records: Southern Peloponnese, Máni Peninsula (map see SCHMALFUSS 2006a: fig. 120).
Distribution: Greece, southernmost Peloponnese.

***Armadillidium marmoratum* Strouhal, 1929**
Synonym: *A. rhodium*.
Redescription: SCHMALFUSS (2006a).
Greek records: Marine littoral biotopes all over Greece (map see SCHMALFUSS 2006a: fig. 153).
Distribution: Coasts of Greece, western Turkey including Black Sea coast, Cyprus, Israel and Egypt (map of overall distribution in SCHMALFUSS 2000: 79: fig. 4).

***Armadillidium messenicum* Verhoeff, 1902**
Redescription: SCHMALFUSS (2006a).
Greek records: Southwestern Peloponnese (map see SCHMALFUSS 2006a: fig. 153).
Distribution: Greece, southwestern Peloponnese.

***Armadillidium meteorense* Schmalfuss, 2012**
Description: SCHMALFUSS (2012).
Greek records: Province Thessaly, prefecture Tríkala, region of Kalambáka (map see SCHMALFUSS 2012: fig. 34).
Distribution: Only known from central Greek mainland, region of Kalambáka.

Armadillidium mycenaeum Strouhal, 1937 = ***A. argolicum***.

Armadillidium naxium Verhoeff, 1901 = nomen dubium.

Armadillidium odysseum Verhoeff, 1901 = ***A. corcyraeum***.

***Armadillidium pallasii* Brandt, 1833**
Redescription: SCHMALFUSS (2011).
Greek records: Ionian island Kérkira (map see SCHMALFUSS 2011: fig. 84).
Distribution: Eastern coast of Italy, Dalmatian coast and islands down to Greek island Kérkira, coasts of the Marmara Sea, Turkish and Bulgarian coasts of Black Sea, ?Crimea.

***Armadillidium pangaionum* Schmalfuss, 2008**
Description: SCHMALFUSS (2008).
Greek records: Northeastern mainland, Pangéo Mountain (map see SCHMALFUSS 2008: fig. 88).
Distribution: Greece, northeastern mainland.

Armadillidium parvum Strouhal, 1938 = ?***A. humectum***.

***Armadillidium pelionense* Strouhal, 1928**
Redescription: SCHMALFUSS (2012).
Greek records: Province Thessaly, prefecture Magnisía, Pílio Mountains (map see SCHMALFUSS 2012: fig. 34).
Distribution: Greece, eastern coast of central mainland.

***Armadillidium peloponnesiacum* Verhoeff, 1901**
Synonyms: *A. bimarginatum*, *A. luridum*, *A. propinquum*.
Redescription: SCHMALFUSS (2006a).
Greek records: Western, central and southern Greece including Ionian islands Lefkáda, Kefaloniá and Zákinthos, and the Aegean islands Évvia and Skíros (map see SCHMALFUSS 2006a: fig. 172).
Distribution: Southwestern Greece.

***Armadillidium peraccae* Tua, 1900 (Fig. 3)**
Redescription: SCHMALFUSS (2006b).
Greek records: Northern Aegean islands Thásos and Lésvos (map see SCHMALFUSS 2006b: fig. 83).
Distribution: Southeastern coast of Italy, northern Aegean islands, coast of the Marmara Sea.

***Armadillidium petralonense* Schmalfuss, 2008**
Description: SCHMALFUSS (2008).
Greek records: Northern mainland, peninsula Khalkidikí (map see SCHMALFUSS 2008: fig. 68).
Distribution: Northern Greek mainland, Khalkidikí.

Fig. 3. *Armadillidium peraccae*, northern Aegean island Thásos.

***Armadillidium phalacronum* Schmalfuss, 2008**
Description: Schmalfuss (2008).
Greek records: Northeastern mainland, Falakró Mountain and western Rodópi Mountains (map see Schmalfuss 2008: fig. 68).
Distribution: Greece, northeastern mainland.

***Armadillidium pieperi* Schmalfuss, 2008**
Description: Schmalfuss (2008).
Greek records: Northern mainland, peninsula Khalkidikí (map see Schmalfuss 2008: fig. 47).
Distribution: Greece, northern mainland, Khalkidikí.

Armadillidium propinquum Strouhal, 1929 = ***A. peloponnesiacum***.

***Armadillidium pseudovulgare* Verhoeff, 1902**
Synonym: *A. veluchiense*.
Redescription: Schmalfuss (2012).
Greek records: Central mainland, prefecture Evritanía, Timfristós Mountain and Panetolikó Mountain (map see Schmalfuss 2012: fig. 66).
Distribution: Greece, central mainland.

Armadillidium rhodium Strouhal, 1937 = ***A. marmoratum***.

Armadillidium samium Strouhal, 1929 = ***A. ameglioi***.

Armadillidium samothracium Strouhal, 1937 = ***A. insulanum***.

Armadillidium schulzi Strouhal, 1929 = ***A. bicurvatum***.

Armadillidium scyrium Strouhal, 1929 = ***A. insulanum***.

***Armadillidium sfenthourakisi* Schmalfuss, 2008**
Description and additional records: Schmalfuss (2008, 2012).
Greek records: Northern mainland, Mount Olympus region (map see Schmalfuss 2012: fig. 66).
Distribution: Greece, northern mainland, Mount Olympus region.

***Armadillidium simile* Strouhal, 1937**
Redescription: Schmalfuss (2011).
Greek records: Ionian island Kérkira (= Corfu).
Distribution: Only known from the Greek Ionian island Kérkira.

***Armadillidium stolikanum* Verhoeff, 1907**
Redescription: Schmalfuss (2012).
Greek records: Southwestern Greek mainland (map see Schmalfuss 2012: fig. 66).
Distribution: Known only from the type locality on the Greek mainland.

***Armadillidium stymphalicum* Schmalfuss, 2006**
Description: Schmalfuss (2006a).
Greek records: Northeastern Peloponnese, region around the Killíni Mountains (map see Schmalfuss 2006a: fig. 153).
Distribution: Greece, northeastern Peloponnese.

Armadillidium thessalorum Verhoeff, 1902 = nomen dubium (see Schmalfuss 1982: 217).

***Armadillidium tripolitzense* Verhoeff, 1902**
Synonyms: *A. olympiacum*, *A. voidiense*.
Redescription: Schmalfuss (2006a).
Greek records: Peloponnese and mountains of Attica (map see Schmalfuss 2006a: fig. 153).
Distribution: Greece, Peloponnese and Attica.

***Armadillidium tuberculatum* Schmalfuss, 2008**
Description and additional records: Schmalfuss (2008, 2012).
Greek records: Eastern Macedonía and northeastern Thessaly (map see Schmalfuss 2012: fig. 71).
Distribution: Greece, northern mainland.

Armadillidium veluchiense Verhoeff, 1902 = ***A. pseudovulgare***.

***Armadillidium versluysi* Strouhal, 1937**
Redescription: Schmalfuss (2012).
Greek records: Central mainland, Parnasós Mountain (map see Schmalfuss 2012: fig. 71).
Distribution: Greece, central mainland.

***Armadillidium vulgare* (Latreille, 1804)**
Synonym: *A. schellenbergi*.
Redescription: Schmalfuss (2006a).
Greek records: Known from all over Greece, but lacking on south-eastern Aegean islands (map see Schmalfuss 2006a: fig. 211).
Distribution: Originated probably in the northeastern Mediterranean region, introduced by human activities to most temperate and even some tropical regions of the world.

***Armadillidium werneri* Strouhal, 1927**
Redescription: Schmalfuss (2011).
Greek records: Known for sure only from the Ionian island Kérkira.
Distribution: Greece, Ionian island Kérkira.

***Armadillidium xerovunense* Strouhal, 1956**
Redescription: Schmalfuss (2010).
Greek records: Western mainland, province Epirus, prefectures Ioánnina and Árta (map see Schmalfuss 2010: fig. 80).
Distribution: Only known from the northwestern Greek mainland.

Armadillidium zuellichi Strouhal, 1937 = ***A. arcadicum***.

4 Distributional categories

In an article on the distributional patterns of the Greek species of *Armadillidium* I have ascribed these species to eight distributional categories (Schmalfuss 2000: 81). The proportions of these categories reflect the restricted mobility of these animals in combination with the restricted distribution areas of the majority of the species as a result of recent radiation processes. I add an updated and somewhat changed version of this list of categories, as in the meantime there have been taxonomic changes and 14 new species have been described in the course of the recent revisions.

Holomediterranean

Armadillidium album
Armadillidium granulatum
Armadillidium vulgare

Eastern Mediterranean

Armadillidium marmoratum

Northeastern Mediterranean

Armadillidium pallasii
Armadillidium peraccae

Eastern Adriatic coast + islands

Armadillidium klugii (= *albanicum* + *inflatum*)

Ionian coast + islands

Armadillidium arcadicum
Armadillidium artense
Armadillidium beieri
Armadillidium cephalonicum
Armadillidium corcyraeum
Armadillidium epiroticum
Armadillidium frontemarginatum
Armadillidium frontetriangulum
Armadillidium hauseni
Armadillidium humectum
Armadillidium jonicum
Armadillidium justi
Armadillidium kalamium
Armadillidium laminigerum
Armadillidium simile
Armadillidium werneri

Western Greece

Armadillidium bicurvatum

Southern Greece

Armadillidium peloponnesiacum

Greek mainland

Armadillidium fossuligerum
Armadillidium gionum
Armadillidium irmengardis
Armadillidium janinense
Armadillidium jerrentrupi
Armadillidium meteorense
Armadillidium pangaionum
Armadillidium petralonense
Armadillidium phalacronum
Armadillidium pieperi
Armadillidium pseudovulgare
Armadillidium sfenthourakisi
Armadillidium stolikanum
Armadillidium tuberculatum
Armadillidium versluysi
Armadillidium xerovunense

Peloponnese

Armadillidium argolicum
Armadillidium bensei
Armadillidium grimmi
Armadillidium kalamatense
Armadillidium kuehnelti
Armadillidium laconicum
Armadillidium lobocurvum
Armadillidium maniatum
Armadillidium messenicum
Armadillidium stymphalicum
Armadillidium tripolitzense

Aegean

Armadillidium aegaeum
Armadillidium ameglioi
Armadillidium atticum
Armadillidium cythereium
Armadillidium insulanum
Armadillidium lymberakisi
Armadillidium pelionense

5 Conclusions

With these 59 species in Greece and comparable or even higher numbers in Ex-Yugoslavia and Italy the genus *Armadillidium* reaches one of the highest species densities among terrestrial isopod genera, only equaled by the genus *Porcellio* on the Iberian Peninsula (around 50 described species). The northern Mediterranean region has worldwide the highest species numbers of terrestrial isopods relative to its area. One reason for this may be these closely related and geologically young species swarms of *Armadillidium* and *Porcellio* and, to a lesser extent, some other genera. They probably differentiated during rather rapidly changing climatic conditions in the Ice Age, and these differentiations were facilitated by the heterogeneous structure of the regions concerned and by the poor dispersal abilities of the isopods. On the Peloponnese there seemed to have existed an ancient stratum of a few species of *Armadillidium*, while during wetter periods in the Pleistocene immigration waves arrived from the north which were "trapped" on the many mountain systems in drier and warmer periods, and so differentiated into a high number of species with very restricted distribution areas (see SCHMALFUSS 2006a: 99).

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Caenidae from East Kalimantan, Borneo (Insecta: Ephemeroptera). With a discussion on phylogeny of the new tribe Clypeocaenini, subfamily Caeninae

Peter Malzacher

Abstract

The here examined Caenidae material from a relatively small area (10 × 6 km), about 140 km W of Tarakan, East Kalimantan, includes representatives of five genera: *Caenis* Stephens, 1835, *Kalimaenis* **n. gen.**, *Clypeocaenis* Soldan, 1978 (all Caeninae), *Tigrocercus* Malzacher, 2006 (Madecocercinae) and *Oriobrachys* Sun & McCafferty, 2008 (Brachycercinae), with the species: *Caenis unidigitata* **n. sp.**, *C. sebastiani* **n. sp.**, *C. fregatula* **n. sp.**, *C. bidigitata* **n. sp.**, *C. abdita* **n. sp.**, *Kalimaenis sibylliana* **n. sp.**, *K. staniczeki* **n. sp.**, *Clypeocaenis soldani* **n. sp.**, *Tigrocercus nastassjae* **n. sp.**, and *Oriobrachys* sp. The system of the subfamily Caeninae, particularly the new tribe Clypeocaenini, is discussed.

Keywords: Caenidae, new tribe Clypeocaenini, new genus *Kalimaenis*, new species, phylogeny, Borneo, Kalimantan.

Zusammenfassung

Das hier untersuchte Caenidae-Material stammt von einem relativ kleinen Areal (10 × 6 km), ungefähr 140 km westlich von Tarakan im Nordosten von Kalimantan. Es enthält fünf verschiedene Gattungen: *Caenis* Stephens, 1835, *Kalimaenis* **n. gen.**, *Clypeocaenis* Soldan, 1978 (alle Caeninae), *Tigrocercus* Malzacher, 2006 (Madecocercinae) und *Oriobrachys* Sun & McCafferty, 2008 (Brachycercinae), mit den Arten: *Caenis unidigitata* **n. sp.**, *C. sebastiani* **n. sp.**, *C. fregatula* **n. sp.**, *C. bidigitata* **n. sp.**, *C. abdita* **n. sp.**, *Kalimaenis sibylliana* **n. sp.**, *K. staniczeki* **n. sp.**, *Clypeocaenis soldani* **n. sp.**, *Tigrocercus nastassjae* **n. sp.** und *Oriobrachys* sp. Das System der Unterfamilie Caeninae wird – unter besonderer Berücksichtigung des neuen Tribus Clypeocaenini – diskutiert.

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1 Introduction

The only species of the family Caenidae from Borneo known so far was *Oriobrachys mahakam* Sun & McCafferty, 2008. The genus belongs to the subfamily Brachycercinae. From the surrounding archipelago only a few species are known. *Caenis nigropunctata* seems to be widely distributed from Sumatra to the Philippines (Ulmer 1939), so that it could also be expected in Borneo, but it is not included in the material described herein. A redescription of the latter species is in preparation, based on the Ulmer material from Java and Sumatra deposited in the Zoologisches Museum Hamburg.

Acknowledgements

My special thanks go to Michel Sartori (Musée cantonal de Zoologie, Lausanne) for leaving me the material for investigation. Thanks are also due to Arnold Staniczek, Susanne Leidenroth and Milan Pallmann (Staatliches Museum für Naturkunde, Stuttgart) for help, making the SEMs and the microphotographs. Michel Sartori and Arnold Staniczek kindly read the manuscript.

2 Material and methods

The investigated material is preserved in 75 % ethanol. It contains several hundred male and female imagines and subimagines

(abbreviated SI) and about 180 larvae, collected between June 2000 and April 2001. Whereas the larvae were collected in an area of about 50 km², 140 km West of Tarakan in the East Kalimantan Province near Malinau, all imagines were light-trapped at only one place within this area. On details of the sampling sites see DERLETH (2003).

The majority of the material, including the types of the newly described species, is stored in the Musée cantonal de Zoologie, Lausanne, Switzerland. Some paratypes are deposited in the Museum of Zoology, Bogor, Indonesia. A small number of specimens is preserved in the author's collection.

Specimens used for SEM were dehydrated through a stepwise immersion in ethanol and then dried by critical point drying. The mounted material was coated with a 20 nm Au layer, examined and photographed with a Zeiss EVO LS 15 scanning electron microscope. Macrophotographs were taken with a Leica Z16 APO Macroscope, processed with Leica Application Suite™ Version 3.1.0 to obtain combined photographs with extended depth of field. Digital photographs were enhanced by using PhotoFiltre.

3 Systematic account

3.1 Genus *Caenis* Stephens, 1835

The genus can be characterised and distinguished from all other genera of Caenidae by the following combination of characters:

Imago. Prosternum with ridges forming a triangle or trapezoid. – Forceps without longitudinal folds or ridges. – Forceps morphologically and functionally not fused together with the styliger plate. – Without a functional unit of forceps, forceps muscle and enlarged lateral sclerite.

Egg. Chorion without longitudinal grooves or rowed structures.

Larva. Thorax not broadened. – Head neither with ocellar tubercles nor with ridges, bulges and/or microscopic pits. – Clypeus anteriorly not protruding. – Maxillary and labial palps three-segmented. – Fore tibia and fore tarsus without very long bristles. – Femora longer than broad and clearly broader than tibiae, without extended plates. – Operculate gill ventrally with a regular row of scale-shaped microtrichia. – A large number (15–26) of filaments on gill III with 3 or more branches. – Lateral spines of abdomen not bent dorsally. – Posterior part of sternum IX dorsally with shagreen field. – Abdominal terga VII–IX without mediolongitudinal ridge. – Hind margin of sternum IX without a bi-pointed process with concave margin between the points.

Caenis unidigitata **n. sp.**
(Fig. 1)

Holotype, ♂ (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 17.IV.2001, P. DERLETH & M. SARTORI.

Paratypes: Same data as holotype, several hundred ♂♂ and ♂♂ SI.

Etymology

The species name refers to the single finger-like projections of the median fore tarsal segments.

Description

Male imago

Measurements, ratios and colouration

Body length 2.3–2.7 mm; wing length 1.6–1.8 mm; length of fore leg 1.7–1.8 mm. – Ratios: Fore femur to fore tibia length = 0.50–0.53; fore tibia to fore tarsus length = 1.38–1.55; fore leg to hind leg length = 1.88–2.00; $1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th}$ fore tarsal segments length = 1 : 3.7–4.5 : 2.9–3.1 : 2.2–2.4 : 1.0–1.1; fore tarsal segments length 3–5 : 1+2 = 1.1–1.6; body length to length of cercus to length of terminal filament = 1 : 1.6 : 2.6; terminal filum to cercus length = 1 : 1.63.

Colouration of cuticle: Metanotum beige; other parts white.

Epidermal pigmentation: Vertex and frons shaded with greyish-brown. Sometimes traces of pigments on prosternal trapezoid, mesosternum and anterior paraterga.

Morphology

Head: Base of antennal flagellum slightly dilated, dilated part nearly as long as and one-third as wide as the pedicel, with surface slightly bumpy, distally more or less abruptly narrowed (Figs. 1d, e).

Thorax: Prosternal ridges thin, forming a trapezoid with concave lateral sides; frontal side with tiny pins; a transverse chitinous strip extending dorsally from the fore margin, nearly reaching the fore coxae (Fig. 1c). Segments II and III of fore tarsus each with an apico-median projection, segment IV with two projections, a lateral and a median one; segment V extremely short (Fig. 1f). Scutellum broad, rounded, only slightly pointed.

Abdomen: Lateral filaments of abdominal segments very short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 1a. Penis broadly rounded. Sclerites uncoloured. Anteriolateral points of forceps bases and anterior margin of styliger sclerite along the same line (Fig. 1a). Apophyses of styliger sclerite very short, often invisible. Apical part of forcipes slightly bent laterally, lateral sides concave; apical spines thin (Fig. 1b).

Female imago and larva unknown.

Differential diagnosis

Caenis unidigitata can be distinguished from all other *Caenis* species by the following combination of charac-

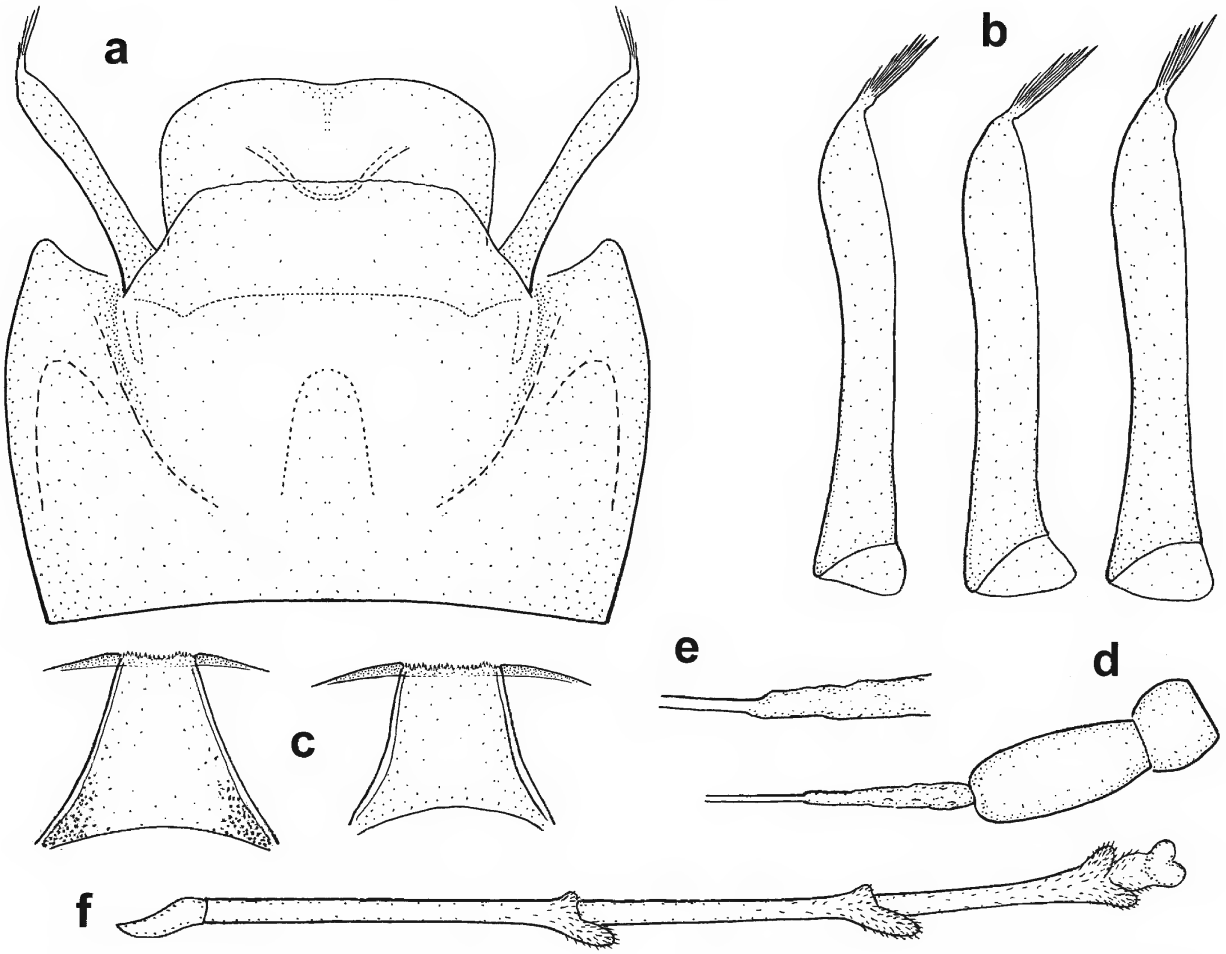


Fig. 1. *Caenis unidigitata* n. sp., ♂. – **a**. Genitalia. **b**. Different shape of forcipes. **c**. Different shape of prosternal trapezoid. **d**. Antennal scape, pedicel and base of flagellum. **e**. Base of flagellum in higher magnification. **f**. Fore tarsus.

ters: Base of antennal flagellum slightly dilated. Forcipes with apical tuft of long spines. Penis without triangular lobes. Abdominal tergum II without finger-like process. – Prosternal ridges anteriorly converging. Segment V of fore tarsus extremely short. Segments II and III each with an apico-median projection. Anteriolateral points of forceps bases and anterior margin of styliger sclerite along the same line. Apophyses of styliger sclerite very short, rounded, often invisible. Apical part of forcipes slightly bent laterally, lateral sides concave.

Caenis sebastiani **n. sp.**
(Figs. 2, 45)

Holotype, ♂ (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 17.IV.2001, P. Derleth & M. Sartori.

Paratypes: Same data as holotype, about 200♂♂, most of them SI. – Same locality and collectors, 20.IV.2001, about 50♂♂, most of them SI.

Other material: B0113, Langab Sud, Rian River, Belakau, 116°30'26"E, 3°04'04"N, 20.IV.2001, P. Derleth & M. Sartori, 1 larva. – B1313, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 28.III.2001, P. Derleth & B. Feldmeyer, 1 larva. – B0812A, Seturan, Seturan River, Temalat, 116°33'29"E, 2°59'29"N, 2.IV.2001, P. Derleth & M. Sartori, 1 larva.

Etymology

The species is named after my nephew Sebastian because he should not be behind his sister Johanna who lends her name to *Caenis johannae* from Madagascar.

Description

Male imago

Measurements and colouration

Body length 2.3–2.7 mm; wing length 1.5–1.8 mm. – Ratios of fore legs etc. cannot be given because the few imagines all have the fore legs missing.

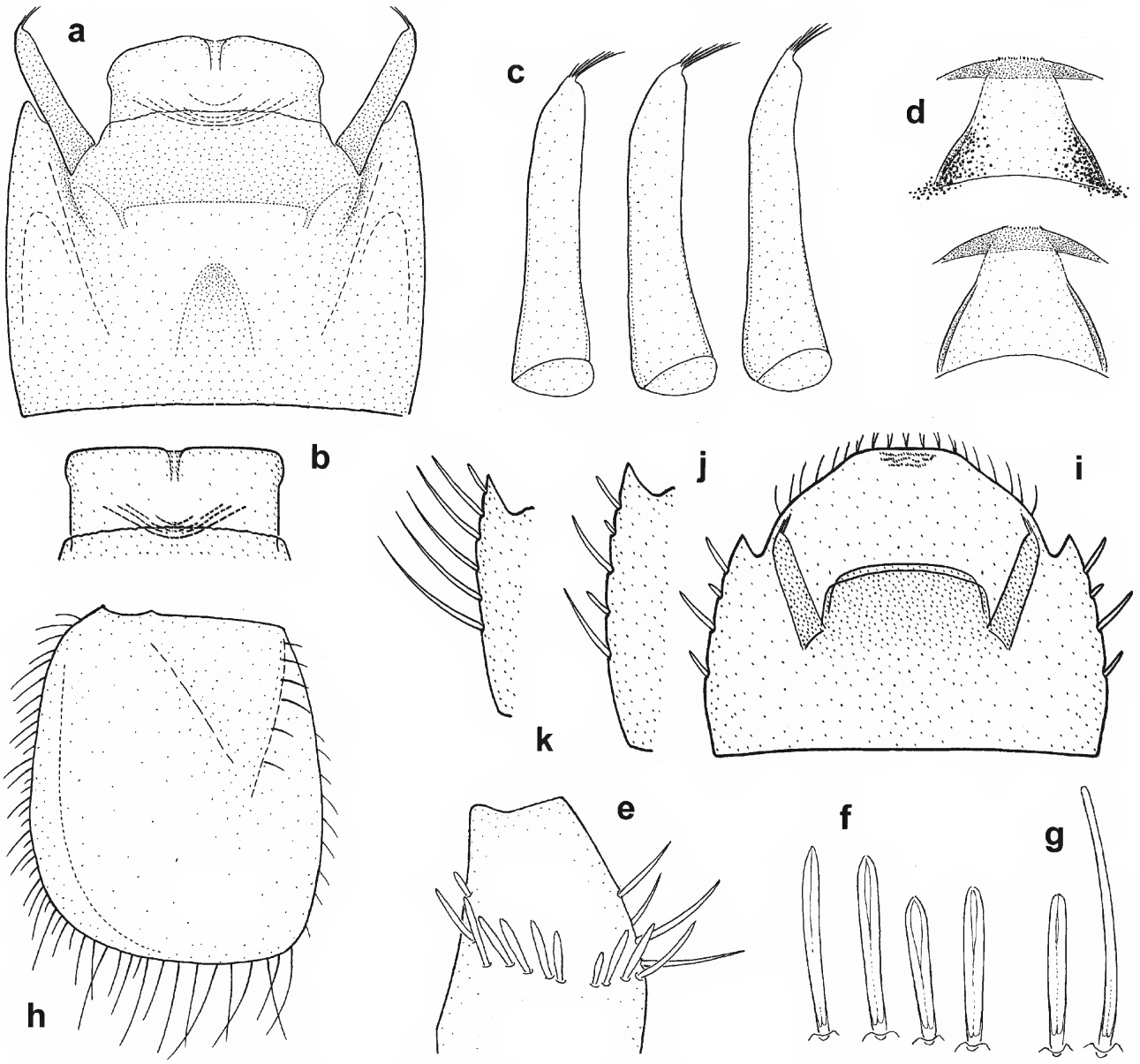


Fig. 2. *Caenis sebastiani* n. sp., ♂ (a–d), larva (e–k). – **a**, **b**. Genitalia (b another penis shape). **c**. Different shape of forcipes. **d**. Different shape of prosternal trapezoid. **e**. Fore femur, distal part with transverse row of bristles. **f**. Bristles from the transverse row. **g**. Bristles from dorsal side of mid and hind femur. **h**. Operculate gill. **i**. Sternum IX, ♂, with subimaginal genitalia. **j**. Marginal setation of abdominal segment VII. **k**. Marginal setation of abdominal segment V.

Colouration of cuticle: Metanotum yellowish- or reddish-brown; other parts yellowish-white.

Epidermal pigmentation: Pigmentation of dorsal and lateral side as in Fig. 45. Vertex and frons evenly intense brown. Pronotum greyish-brown with two paramedian spots and sometimes sublateral lightenings. Abdominal terga with grey transverse bands often medially more or less interrupted. Prosternal trapezoid with basolateral pigmentations, a curved dark line extending from the hind corners laterally.

Morphology

Head: Antennal base similar to that of *Caenis unidigitata,* flagellum slightly dilated, dilated part two-thirds to three-fourths as long as and one-fourth as wide as the pedicel, surface scarcely bumpy, distally more or less abruptly narrowed.

Thorax: Prosternal ridges forming something like a trapezoid or broadly rounded triangle with lateral sides posteriorly convex, frontal side sunken dorsad, transverse chitinous strip often more posteriorly (Fig. 2d). Segments

II and III of fore tarsus with an apico-median projection, segment IV with two projections, a lateral and a median one (as in Fig. 1f).

Abdomen: Lateral filaments of abdominal segments very short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Figs. 2a, b. Penis shape variable, more or less rounded, hind margin straight and slightly angled; sometimes with very short rounded penis lobes. Styliger sclerite slightly beige-coloured, its basal margin extending anterior to the forceps bases. Apophyses of styliger sclerite short and narrow, but clearly visible. Forcipes not bent, lateral sides more or less straight; apical spines long and very thin (Fig. 2c).

Female imago unknown.

Larva

Measurements and colouration

Male larva of last instar, body length 2.7 mm, length of cerci 1.8 mm; female larva of last instar not available.

Colouration of cuticle: Yellowish-brown.

Epidermal pigmentation: Head with a narrow band of grey pigments between the lateral ocelli, surrounding of frontal ocellus shaded with grey. Pronotum with pattern similar to that of the males. Mesonotum with irregular marks anterior to wing pads. Abdominal pigmentation as in the males.

Morphology

Surface: Honeycombed or with net-meshes, often with posterior or lateral denticles (e. g. femora, operculate gills).

Head: Genae slightly bulging out. Pedicel with about 10 strong bristles. Labrum with broadly rounded corners, anterior margin with a strongly denticulated indentation. Mandibles with long bent setae on lateral margin. Second segment of labial palp about twice the length of the third (measured along the centre-line); outer margin with about 8 strong bristles.

Thorax: Sides of pronotum strongly denticulated, diverging anteriorly; fore corners rounded with 4–5 stout bristles slightly bent posteriorly. Coxal processes inconspicuous. Femora and tibiae of mid and hind legs with long, more or less spatulate bristles (the shorter, the more spatulate, Fig. 2g). Transverse row on fore femur consisting of similar bristles, forming a basket (Figs. 2e, f). Fore tibia medially with very long setae. Fore tarsus ventrally with inner row of 4–5 simple bristles; mid tarsus ventrally with inner row of 5–6 simple bristles; hind tarsus with inner row of 6–7 simple bristles and short outer row of 2–3 pinnate bristles. Claws slender, without denticulation.

Abdomen: Abdominal segments with short postero-lateral processes. Lateral bristles long, slightly shorter on segments VIII and IX (Figs. 2i–k). Posteriomedian process of tergum II short, broadly triangular, pointed and moderately erect in lateral view (slightly more erect than in Fig. 4g). Hind margin of terga VII and VIII with very long bristles, of terga IX and X with denticles. Hind margin of sternum IX medially cut or with a very shallow indentation, with short bifurcate bristles (Fig. 2i). Operculate gills with thin bristles on medial margin, hind margin with very long hair-like bristles, lateral margin with more or less blunt bristles of moderate length; medial ridge only anteriorly developed, with about 6 bristles similar to that on lateral margin, posterior part of medial ridge obliterated, ridges medially not connected (Fig. 2h). Ventral row of microtrichia extending to the middle of the hind margin of the gill. Shape of microtrichia similar to that of *Caenis fregatula* (Fig. 17), slightly stronger and clearly visible in light microscopic view. Cerci with strong and pointed spines.

Differential diagnosis

Caenis sebastiani can be distinguished from all other *Caenis* species by the following combination of characters: Base of antennal flagellum slightly dilated. Forcipes with apical tuft of long spines. Penis without triangular lobes. Abdominal tergum II without finger-like process. – Prosternal ridges anteriorly converging, forming a trapezoid with lateral sides posteriorly convex. Segment V of fore tarsus extremely short. Segments II and III each with an apico-median projection. Basal margin of styliger sclerite extending anteriorly from the forceps bases. Apophyses of styliger sclerite short and narrow but clearly visible. Forcipes straight, with very thin apical spines.

For further differential diagnosis of this and the following *Caenis* species see discussion (section 5).

Remarks

The assignment to the males is based on a larva with visible subimaginal genitalia, showing short and straight forcipes (Fig. 2i) and fore tarsi with median projections only on segments II and III.

Caenis fregatula **n. sp.**
(Figs. 3, 14–17)

Holotype, ♂ (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 20.IV.2001. P. Derleth & M. Sartori.

Other material: B0513, Seturan, Seturan River, Tamalang, 116°30'29"E, 2°59'22"N, 10.IV.2001, P. Derleth, 3 larvae. – B0812, Seturan, Seturan River, Temalat, 116°33'29"E, 2°59'29"N, 16.VIII.2000, P. Derleth & R. Schlaepfer, 1 larva. – B0833, same locality, 16.IV.2001, P. Derleth & M. Sartori, 1 larva.

Etymology

The species name *fregatula*, a diminutive of *Fregata*, refers to the shape of the forcipes that resembles the long pointed and diverging tails of frigate birds (e. g. *Fregata magnificens*).

Description

Male imago

Measurements, ratios and colouration

Body length 2.5 mm; wing length 1.5–1.6 mm; length of fore leg 1.7–1.8 mm. – Ratios: Fore femur to fore tibia length = 0.55–0.65; fore tibia to fore tarsus length = 1.02–1.19; fore leg to hind leg length = 1.70–1.76; $1^{st} : 2^{nd} : 3^{rd} : 4^{th} : 5^{th}$ fore tarsal segments length = 1 : 4.6–4.8 : 3.0–3.1 : 2.3–2.8 : 1.1–1.2; fore tarsal segments length 3–5 : 1+2 = 1.1–1.3.

Colouration of cuticle: Metanotum beige; other parts yellowish-white.

Epidermal pigmentation: Vertex and frons without pigments. Pronotum laterally with longitudinal, blackish, anteriorly broadened dashes; posteriorly with transverse blackish-grey band with paramedian and sublateral lightenings. Prosternal trapezoid with basolateral pigmentations, a curved dark line extending from the hind corners laterally. Posterior parapsidal sutures on mesonotum and base of scutellum pigmented. Blackish-grey marks on each side of abdominal terga III–VII, I and II with small lateral spots; all segments with blackish paratergal spots or dashes.

Morphology

Head: Base of antennal flagellum slightly dilated, dilated part nearly as long as and one-third as wide as the pedicel, with surface slightly bumpy.

Thorax: Prosternal ridges thin, anteriorly parallel, posterior third converging, rounded; transverse chitinous strip narrow, not reaching fore coxae (Fig. 3c). Segments II and III of fore tarsus each with an apico-median projection, segment IV with two projections, a lateral and a median one; segment V extremely short (as in Fig. 1f).

Abdomen: Lateral filaments of abdominal segments very short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 3a. Penis with short, broadly rounded lobes, hind margin medially slightly convex; penis shaft inflated, about as wide as penis lobes. Styliger sclerite short and broad, medial part of anterior margin, between the very short apophyses, curved posteriorly. Forcipes very long, slender and pointed, evenly narrowed to the tip, apical part slightly bent laterally; basal

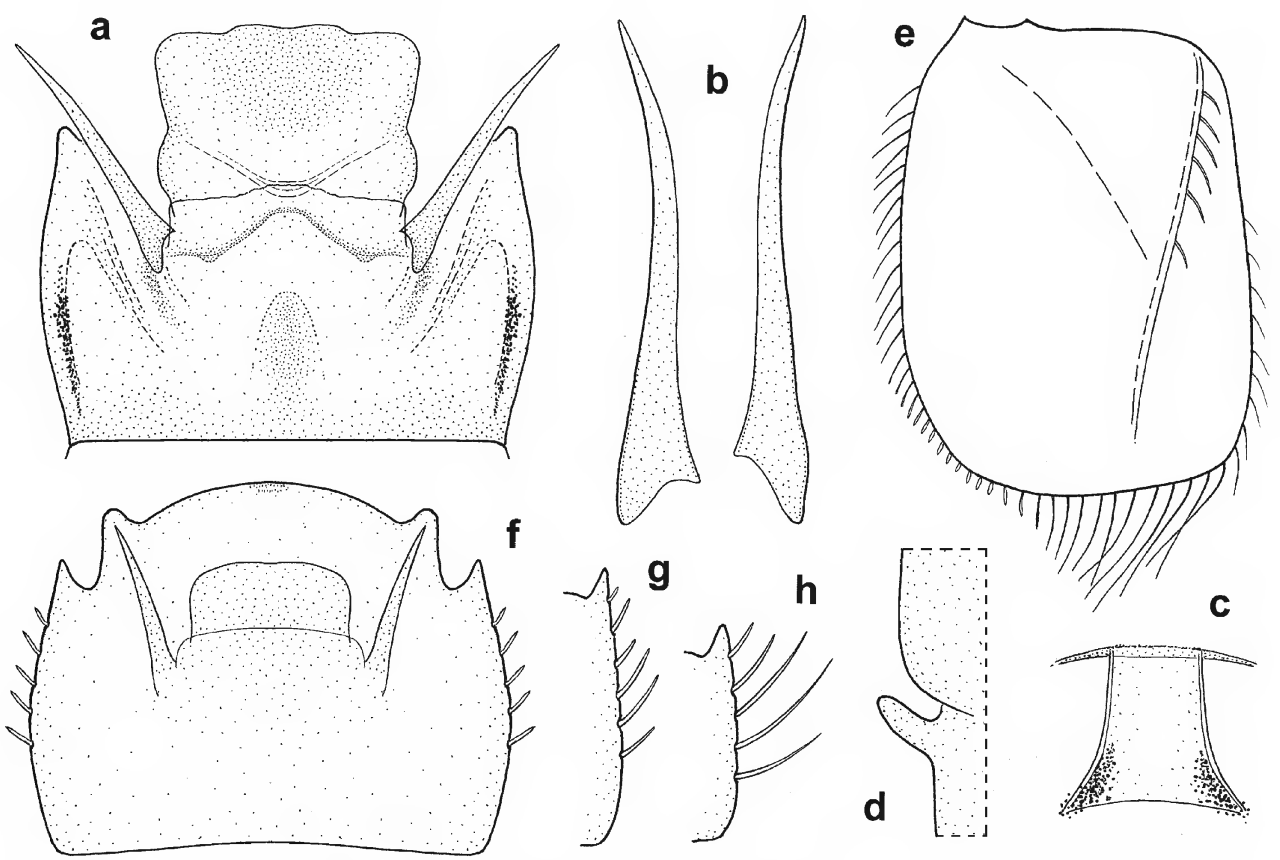


Fig. 3. *Caenis fregatula* n. sp., ♂ (a–c), larva (d–h). – **a**. Genitalia. **b**. Different shape of forcipes. **c**. Posternal trapezoid. **d**. Posteriomedian process of tergum II, lateral view. **e**. Operculate gill. **f.** Sternum IX, ♂, with subimaginal genitalia. **g**. Marginal setation of abdominal segment VII. **h**. Marginal setation of abdominal segment V.

two-thirds with very short trichoma, apical third without (Fig. 3b).

Female imago unknown.

Larva

Measurements and colouration

Male larva of last instar, body length 2.5 mm, length of cerci 1.5 mm; female larva of last instar not available.

Colouration of cuticle: Pale beige with yellowish-brown pattern on the following parts: lateral parts of pronotum, two spots at the base of the wing pads and a double mark posteriorly between them (giving the mesonotum a certain similarity with the frontal view of a lion face), the field between Y-shaped ridges and a posterior round mark on operculate gills and marks on each side of abdominal terga.

Epidermal pigmentation: Apart from eyes and ocelli no pigments visible.

Morphology

Surface: Head, pro- and mesonotum granulated, with paramedian fields of flat round- and net-meshes (Fig. 14), between the granules with small, fragile, branched bristles (Fig. 15). Metanotum, femora and abdominal terga with net-meshes and fine denticles, operculate gills with strong denticles, the field medially from the longitudinal ridge with honeycombs.

Head: Genae slightly bulging out. Labrum with broadly rounded corners, anterior margin with a shallow indentation. Mandibles only with a few very thin bristles on dorsal surface. Second segment of labial palp about 1.8 times the length of the third (measured along the centre-line); strong bristles on lateral side of second segment only basally.

Thorax: Sides of pronotum anteriorly moderately or strongly diverging, straight or slightly convave (Fig. 16), denticulated, fore corner with inconspicuous short bristles. Coxal processes inconspicuous. Femora and tibiae of mid and hind legs with numerous long marginal bristles; femora with a few shorter spatulate bristles on dorsal surface, an additional longitudinal row of long more or less spatulate bristles extending dorsally on tibiae. Bristles of the transverse row on fore femur of moderate length, spatulate. Fore and mid tarsus ventrally with inner row of 7–8 slender and pointed bristles, hind tarsus with inner row of about 7–8 strong simple bristles and outer row of 4–5 unipinnate bristles, pinnae directed medially. Claws slender, without denticulation.

Abdomen: Abdominal segments with short postero-lateral processes, lateral bristles long, shorter on segments VIII and IX (Figs. 3f–h). Posteriomedian process of tergum II long, cone-shaped, erect in lateral view (Fig. 3d). Hind margin of tergum VII with numerous long bristles, of tergum VIII with only a few bristles but additionally with denticles in the median part. Hind margin of tergum IX and X with denticles only. Hind margin of sternum IX flatly rounded, with a few very short bifurcate bristles; in adult male larvae (the only one that could be identified with certainty) there are two triangular protrusions where the tips of subimaginal forcipes are situated (Fig. 3f). Operculate gills with short spatulate bristles on postero-lateral corner, followed by long thin bristles on hind margin and bristles of moderate length on lateral margin. Y-shaped ridges well-developed, medial ridge more or less keeled, with about 5 bristles of moderate length in its basal half (Fig. 3e). Ventral row of microtrichia extending to the middle of the hind margin of the gill. Shape of microtrichia as in Fig. 17, delicate and nearly invisible in light microscopic view.

Differential diagnosis

Caenis fregatula can be distinguished from all other *Caenis* species by the following combination of characters: Base of antennal flagellum slightly dilated. Forcipes without tuft of long spines. Penis without triangular lobes. Abdominal tergum II without finger-like process. – Prosternal ridges parallel in the anterior two-thirds. Segment V of fore tarsus extremely short. Segments II and III each with an apico-median projection. Penis with short, broadly rounded lobes, hind margin medially slightly convex; penis shaft inflated. Styliger sclerite short and broad, medial part of anterior margin, between the very short apophyses, curved posteriorly. Forcipes very long, slender and pointed, evenly narrowed to the tip.

Remarks

The assignment to the males is based on a larva with visible subimaginal genitalia, showing the characteristic shape of forcipes (Fig. 3f); fore tarsi with median projections only on segments II and III.

Caenis bidigitata **n. sp.**
(Figs. 4, 5, 18–25)

Holotype, ♂ (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 17.IV.2001, P. Derleth & M. Sartori.

Paratypes: Same data as holotype, about 250 ♂♂, most of them SI, 5 ♀♀.

Other material: B0113, Langap Sud, Rian River, Belakau, 116°30'26"E, 3°04'04"N, 20.IV.2001, P. Derleth & M. Sartori, 11 larvae. – B0433, Langap Sud, Rian River, Ngayo, 116°30'58"E, 3°04'56"N, 14.IV.2001; P. Derleth & M. Sartori, 3 larvae. – B0421, same locality, 12.VII.2000; P. Derleth, 1 larva. – B0631, Seturan, Seturan River, Wok, 116°33'30"E, 2°59'11"N, 29.VI.2000, P. Derleth, 17 larvae. – B0713, C, same locality, 5.IV.2001, P. Derleth & B. Feldmeyer, 6 larvae. – B0811, Seturan, Seturan River, Temalat, 116°33'29"E, 2°59'29"N, 18.VI.2000, P. Derleth & J.-L. Gattolliat, 1 larva. –

B0812, same locality, 16.VIII.2000, P. Derleth & R. Schlaepfer, 1 larva. – B0833, same locality, 16.IV.2001, P. Derleth & M. Sartori, 3 larvae.

Etymology

The species name refers to the two projections of the median fore tarsal segments.

Description

Male imago

Measurements, ratios and colouration

Body length 2.2–2.5 mm; wing length 1.5–1.7 mm. – Ratios: Fore femur to fore tibia length = 0.45–0.46; fore tibia to fore tarsus length = 1.61–1.81; fore leg to hind leg length = 2.23–2.31; 1st : 2nd : 3rd : 4th : 5th fore tarsal segments length = 1 : 6.4–6.7 : 1.8–1.9 : 1.7–1.8 : 1.0–1.3; fore tarsal segment 2 very long, segments 3–5 : 1+2 = 0.6–0.7.

Colouration of cuticle: Metanotum beige, with brownish median notal suture; other parts yellowish-white.

Epidermal pigmentation: Vertex and frons medium brown, posterior part of vertex lighter. Antero-lateral parts of pronotum greyish, two paramedian dark marks. Scutellum basally pigmented. Abdominal terga with greyish transverse bands often medially interrupted.

Morphology

Head: Base of antennal flagellum slightly dilated, dilated part as long as and one-fourth as wide as the pedicel, surface smooth, transition to the distal part of flagellum smooth (Fig. 4e).

Thorax: Prosternal ridges anteriorly converging, often forming a broadly rounded triangle; transverse strip short or nearly invisible (Fig. 4d). Segments II–IV of fore tarsus each with two projections, a lateral and a median one; segment II extremely long, 1.3 times as long as segments III–V together (Fig. 4f). Scutellum narrow, pointed.

Abdomen: Lateral filaments of abdominal segments very short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 4a. Penis anvil-shaped, with sclerotized hind margin. Apophyses of styliger sclerite nearly invisible. Forcipes slender, slightly waisted medially, apical part slightly bent (Fig. 4b); 2–3 apical spines fused together to a short tip; basal part of the tip often showing an S-shaped curvature (Figs. 4b, c).

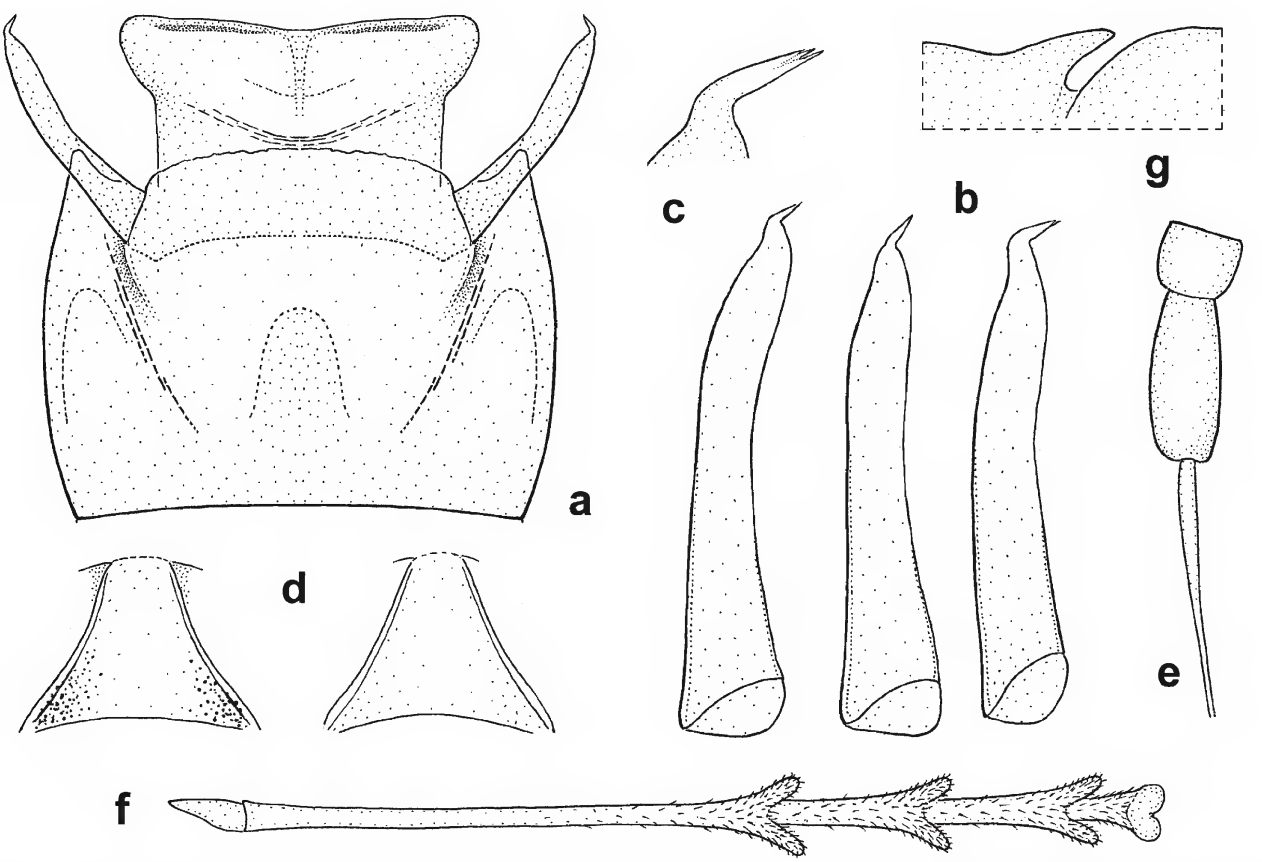


Fig. 4. *Caenis bidigitata* n. sp., ♂. – **a**. Genitalia. **b**. Different shape of forcipes. **c**. Tip of forceps in higher magnification. **d**. Different shape of prosternal trapezoid. **e**. Antennal scape, pedicel and base of flagellum. **f**. Fore tarsus.

Female imago

Measurements and colouration

Body length 2.5–3.2 mm; wing length 2.0–2.2 mm.

Colouration of cuticle: Metanotum brown, with brownish median notal suture not as strongly brown as in males; other parts light yellowish-brown to white. In contrary to females of the other species the hind margin of mesosternum is strongly brown sclerotized.

Epidermal pigmentation: Frons and anterior part of vertex brown, posterior part pale. Basal part of scutellum strongly pigmented, inner margin of lateral sclerites blackish; often with blackish-grey dashes on posterior part of parapsidal sutures. Abdominal terga with grey transverse bands.

Remarks

After the identification of larvae (see below) some females could be assigned to the species by shape and structure of the eggs.

Egg

Chorion finely pored. Micropyle of moderate length, posteriorly broadened (Fig. 19). Two epithemata of coiled-rope-type, with a more or less eccentric position towards the poles (Fig. 18). Epithemata of a modified *C. perpusilla* subtype (see discussion and Malzacher 2011), with 6–8 threads, forming loops by turning about (Fig. 20), and 2–3 tiny terminal knobs hardly visible in light microscopic view. Knobs give end to 1–4 threads (Fig. 21).

Larva

Measurements and colouration

Male larva of last instar, body length 2.2–2.5 mm, length of cerci 1.5 mm; female larva of last instar, body length 2.8–3.2 mm, length of cerci 2.0–2.3 mm.

Colouration of cuticle: Pale, yellow to brownish-yellow.

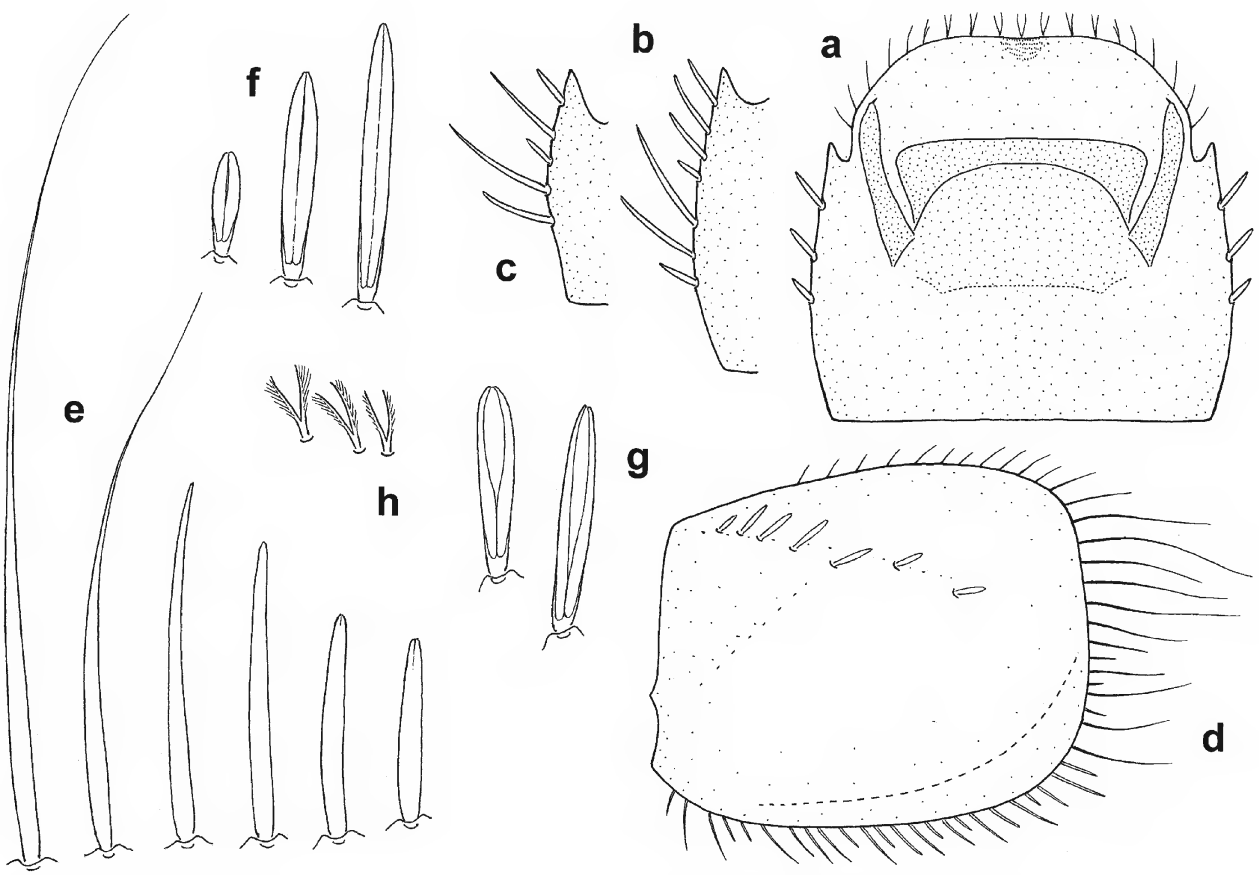


Fig. 5. *Caenis bidigitata* n. sp., larva. – **a**. Sternum IX, ♂, with subimaginal genitalia. **b**. Marginal setation of abdominal segment VII. **c**. Marginal setation of abdominal segment V. **d**. Operculate gill. **e**. Bristles from hind margin (left) and lateral margin (right) of operculate gill. **f**. Bristles from the transverse row on fore femur. **g**. Bristles from dorsal side of mid and hind femur. **h**. Bristles from hind margin of sternum IX.

Epidermal pigmentation: Frons and transverse band on vertex greyish. Pronotum diffusely greyish painted, often with sublateral lightenings. Mesonotum with antero-lateral longitudinal dashes and paramedian spots.

Morphology

Surface: Structure inconspicuous, sometimes with traces of delicate net-meshes and very small denticles (femora); operculate gills with stronger denticles but without distinct meshes.

Head: Genae not bulging out. Pedicel with 10 or more strong bristles. Labrum with broadly rounded corners, anterior margin smooth, slightly concave. Mandibles with a dorso-lateral field of very long bent setae. Second segment of labial palp about 2.3 times as long as third (measured along the centre-line); basal half of outer margin with 4–5 strong bristles.

Thorax: Sides of pronotum straight to convex, diverging anteriorly, smooth or with very delicate denticles; fore corners broadly rounded with 4–5 strong and long spatulate bristles (Fig. 23). Coxal processes inconspicuous. Femora and tibiae of mid and hind legs with long, more or less spatulate bristles (Fig. 22). Bristles on the dorsal surface strong and broad (Fig. 5f). Bristles of the transverse row on fore femur (Figs. 5g, 23) in comparison with *C. sebastiani* stronger and broader (as generally all spatulate bristles). Fore tibia medially with very long setae, the longest sometimes as long as three-fourths of femur width. Fore tarsus ventrally with inner row of 2–4 small bristles; mid tarsus ventrally with inner row of about 5 small bristles; hind tarsus with inner row of 3–4 simple bristles and short outer row of 2–3 pinnate bristles. Claws slender, without denticulation.

Abdomen: Abdominal segments with short postero-lateral processes. Lateral bristles long, slightly shorter on segments VIII and IX (Figs. 5a–c). Posteriomedian process of tergum II very short, broadly triangular, pointed in lateral view (Fig. 4g). Hind margin of terga VII and VIII with very long bristles, of terga IX and X with denticles. Hind margin of sternum IX broadly rounded, medially with a shallow indentation (Fig. 5a), with short bifurcate and frayed bristles (Fig. 5h). Operculate gills (Fig. 5d) with thin bristles on medial margin, hind margin with very long bristles with basal part broadened and apical part very thin hair-like (Fig. 5e, left; this kind of bristles can also be found on hind margin of terga VII and VIII and on lateral margins of anterior abdominal segments); lateral margin of operculate gills with blunt bristles of moderate length (Fig. 5e, right); Y-shaped ridges strongly reduced, medial one lacking, marked only by the row of 6–8 short, broadly spatulate bristles (Fig. 5d). Ventral side of operculate gill basally with frayed bristles (Fig. 24). Ventral row of microtrichia ending lateral to (Fig. 5d) or exceeding the middle of the hind margin of the gill. Microtrichia more or less elongated (Fig. 25).

Differential diagnosis

Caenis bidigitata can be distinguished from all other *Caenis* species by the following combination of characters: Base of antennal flagellum slightly dilated. Forcipes without tuft of long spines. Penis with triangular lobes. Abdominal tergum II without finger-like process. – Prosternal ridges anteriorly converging, forming an open triangle or a narrow trapezoid. Segment V of fore tarsus extremely short. Segments II–IV of fore tarsus each with two projections, a lateral and a median one; segment II extremely long. Penis anvil-shaped with sclerotized hind margin. Apophyses of styliger sclerite nearly invisible. Forcipes with 2–3 apical spines fused together to a short tip. – Egg with two epithemata of coiled-rope type and *perpusilla* subtype.

Remarks

The assignment to the males is based on three larvae with visible subimaginal genitalia, showing the characteristic shape of forcipes and penis; fore tarsi with two apical projections on segments II and III. (Fig. 5a).

Caenis abdita **n. sp.**
(Figs. 6, 26–28, 46)

Holotype, ♂ SI (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 20.IV.2001, P. Derleth & M. Sartori.

Paratypes: Same data as holotype, 3 ♂♂ SI.

Other material: B0111, Langap Sud, Rian River, Belakau, 116°30'26"E, 3°04'04"N, 5.VII.2000, P. Derleth, 1 larva. – B0121, same locality, 7.VII.2000, P. Derleth, 31 larvae. – B0123, same locality, 18.IV.2001, P. Derleth & M. Sartori, 1 larva. – B0113, same locality, 20.IV.2001, P. Derleth & M. Sartori, 1 larva. – B0421, Langap Sud, Rian River, Ngayo, 116°30'58"E, 3°04'56"N, 12.VII.2000, P. Derleth, 6 larvae. – B0513, B0521, Seturan, Seturan River, Tamalang, 19.VII.2000, P. Derleth, 2 larvae. – B0513, same locality, 10.IV.2001, P. Derleth, 1 larva. – B0713, Seturan, Seturan River, Wok, 116°32'25"E, 3°00'09"N, 05.IV.2001, P. Derleth & B. Feldmeyer, 3 larvae. – B0811, Seturan, Seturan River, Temalat, 116°33'29"E, 2°59'29"N, 18.VI.2000, P. Derleth & J.-L. Gattolliat, 2 larvae. – B0821, same locality, 21.VI.2000, P. Derleth & J.-L. Gattolliat, 2 larvae. – B0812, same locality, 16.VIII.2000, P. Derleth, 1 larva. – B0812, same locality, 2.IV.2001, P. Derleth & M. Sartori, 3 larvae. – B0823, same locality, 4.IV.2001, P. Derleth, 1 larva. – B0833, same locality, 16.IV.2001, P. Derleth & M. Sartori, 1 larva. – B1211, Langap Sud, Rian River, tributary, 116°31'05"E, 3°01'40"N, 11.VII.2000, P. Derleth, 1 larva. – B1013, Seturan, Rian River, tributary, 116°32'16"E, 3°00'57"N, 30.III.2001, P. Derleth, 1 larva. – B1413/B1423, Seturan, Seturan River, tributary, 116°33'30"E, 2°58'58"N, 24.IV.2001, P. Derleth & M. Sartori, 6 larvae.

Etymology

The species name *abdita* (from Latin abdere = to hide) refers to the larval mud cover which often completely hides the body.

Description

Male subimago

Measurements and colouration

Body length 2.5–2.7 mm; wing length 1.5–1.8 mm. – Ratios of fore legs etc. cannot be given because there are only three subimagines available whose fore legs are not finally developed.

Colouration of cuticle: Metanotum beige; other parts yellowish-white.

Epidermal pigmentation: Vertex and frons brownish. Abdominal terga with weakly greyish-brown sublateral marks.

Morphology

Head: Base of antennal flagellum not dilated.

Thorax: Prosternal ridges thin and straight, strongly converging anteriorly, forming a very broadly rounded triangle; transverse strip invisible (Fig. 6d). Segments II–IV of fore tarsus each with two projections, a lateral and a median one.

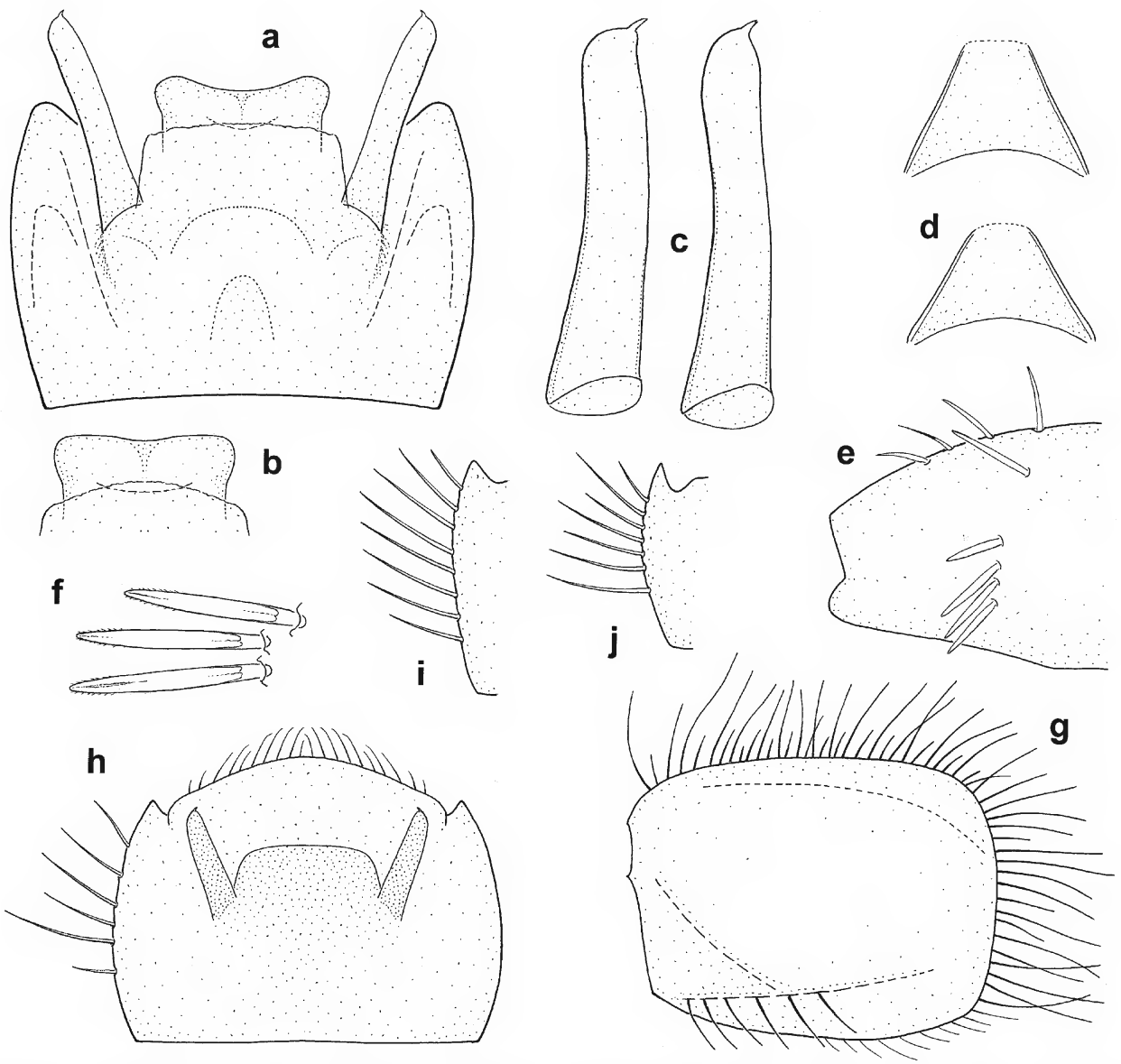


Fig. 6. *Caenis abdita* n. sp., ♂ (a–d), larva (d–h). – **a**, **b**. Genitalia (b another penis shape). **c**. Different shape of forcipes. **d**. Different shape of prosternal trapezoid. **e**. Fore femur, distal part with transverse row of bristles. **f**. Bristles from the transverse row. **g**. Operculate gill. **h**. Sternum IX, ♂, with subimaginal genitalia. **i**. Marginal setation of abdominal segment VII. **j**. Marginal setation of abdominal segment V.

Abdomen: Lateral filaments of abdominal segments lacking. Without finger-like process on tergum II.

Genitalia and sternum IX as in Figs. 6a, b. Penis with short, broadly rounded lobes, hind margin more or less concave. Anterior margin of styliger sclerite curved, apophyses short and broad. Forcipes slightly bent laterally, with more or less parallel sides, apically broadly rounded, with a short, broad spine inserting medially (Fig. 6c).

Female imago unknown.

Egg

Chorion fine and densely pored (Fig. 27). One epithema, very flat and spread towards equator (Fig. 26). One long micropyle, mouth not broadened, sperm-guide small and circular (Fig. 27). – The described egg is from a female last instar larva.

Larva

Measurements and colouration

Male larva of last instar, body length 2.5–2.6 mm, length of cerci 1.8 mm; female larva of last instar, body length 2.7–3.2 mm, length of cerci 2.0–2.3 mm.

Colouration of cuticle: Pale, yellowish-brown.

Epidermal pigmentation: Apart from eyes and ocelli no pigments visible.

Morphology

Surface: Head, pro- and mesonotum coarsely granulated, metanotum, first abdominal tergum and femora with net-meshes and denticles or small spines. Body surface bearing numerous long bristles and hairs with a lot of detritus particles sticking to them, so that the whole larva is entirely covered with mud (Fig. 46). Highly magnified SEM pictures show a network of very fine threads spreading through the detritus particles, the threads seemingly originating from the bristles.

Head: Clypeus with transverse ridge, but not protruding anteriorly. Genae not bulging out. Labrum with broadly rounded corners, anterior margin smooth, slightly concave. Mandibles only with a few very thin bristles on dorsal surface. Second segment of labial palp about 1.7 times as long as third (measured along the centre-line).

Thorax: Sides of pronotum straight and parallel, fore corners slightly curved medially; without lateral flattened areas, margins more or less denticulated. Coxal processes inconspicuous. Femora and tibiae of mid and hind legs with numerous long bristles and sensitive hairs. Fore tibia anteriorly with a row of very long bristles. Bristles of the transverse row on fore femur relatively small, narrow and blunt, tip inconspicuously frayed (Figs. 6e, f). Fore tarsus ventrally with inner row of 4–5 slender and pointed bristles; mid tarsus ventrally with inner row of about 6 stronger bristles; hind tarsus with inner row of about 7 strong simple bristles, no pinnate bristles as in the other herein described *Caenis* larvae. Claws without denticulation, apically slightly more bent than in the above described species.

Abdomen: Abdominal segments with short postero-lateral processes, with long and pointed lateral bristles, also on segments VIII and IX (Figs. 6h–j). Posteriomedian process of tergum II very short, broadly triangular, scarcely visible in dorsal view, pointed and more or less erect in lateral view. Hind margin of terga VII and VIII with very long bristles, often longer as the posteriorly following tergum. Hind margin of tergum IX with denticles and about 4 long bristles, of tergum X with spine-shaped denticles about twice or even three times as long as denticles on tergum IX. Hind margin of sternum IX only slightly protruding, medially more or less angled (in female larvae slightly more rounded), with long simple bristles that are apico-medially bent (Fig. 6h). Operculate gills with very thin bristles on medial margin, lateral and hind margin with very long bristles, lateral margin additionally with shorter ones. Y-shaped ridges well-developed, basal half of medial ridge with about 6 long strong and pointed bristles (Fig. 6g). Ventral row of microtrichia not reaching the middle of the hind margin of the gill. Shape of microtrichia square or rounded (Fig. 28).

Differential diagnosis

Caenis abdita can be distinguished from all other *Caenis* species by the following combination of characters: Base of antennal flagellum not dilated. Forcipes without tuft of long spines. Penis without triangular lobes. Abdominal tergum II without finger-like process. – Prosternal ridges strongly converging anteriorly, forming a trapezoid. Segments II–IV of fore tarsus each with two projections, a lateral and a median one. Penis with short, broadly rounded lobes, hind margin slightly concave. Forceps apically broadly rounded, with a short, broad spine inserting medially.

Remarks

The assignment to the males is based on two larvae with visible subimaginal genitalia, showing the characteristic shape of forcipes (Fig. 6h), fore tarsi with two apical projections on segments II and III and base of antennal flagellum not dilated.

3.2 Genus *Kalimaenis* **n. gen.**

Type species: *Kalimaenis sibylliana* n. sp.

The genus can be characterised and distinguished from all other genera of Caenidae by the following combination of characters:

Imago. Prosternum with ridges forming a broad trapezoid or rectangle. – Metanotum elongated. – Lateral filaments of abdominal segments very short. – Forceps very long, with apical tuft of long spines, without longitudinal folds or ridges. – Forceps morphologically and functionally not fused together with the styliger plate. – No functional unit as in the Brachycercinae, but with a well-developed forceps muscle.

Egg. Chorion without longitudinal grooves or rowed structures. – Micropyle very short.

Larva. Thorax not broadened. – Head without ocellar tubercles and microscopic pits but with ridges or bulges. – Clypeus anteriorly protruding, protrusion with straight fore margin, without setation. – Maxillary and labial palps three-segmented. – Maxillary palp very slender, segment I apically converging, segments II and III coiled. – Segment III of labial palp very short, with very oblique dividing line to segment II. – Legs, particularly of female larvae, narrow and slender. – Fore leg clearly shorter than hind leg. – Fore tibia and fore tarsus without very long bristles. – Hind claws with groups of micro-denticles fused together. – Gill I very short, one-fourth length of gill-cover. – Operculate gill ventrally with a regular row of microtrichia, row ending away from hind margin of gill. – Number of filaments on gills III–VI reduced; only about 7 filaments with 3 or more branches on gill III. – Lateral spines of abdomen not bent dorsally. – Posterior part of sternum IX dorsally with shagreen field. – Abdominal terga VII–IX without mediolongitudinal ridge. – Hind margin of sternum IX without a bi-pointed process with concave margin between the points.

Etymology

The genus name is a combination of Kalimantan and *Caenis*.

Kalimaenis sibylliana **n. sp.**
(Figs. 7a–c, 8, 12a, b, 13e, 29–36)

Holotype, ♂ SI (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 17.IV.2001, P. Derleth & M. Sartori.

Paratypes: Seturan, Seturan River, tributary, 116°30'31"E, 3°00'57"N, 20.IV.2001, P. Derleth & M. Sartori, 2 ♂♂ SI.

Other material: B0431, Langap Sud, Rian River, Ngayo, 116°30'58"E, 3°04'56"N, 13.VII.2000, P. Derleth, 3 larvae. – B0541, Seturan, Seturan River, Bengahau, 116°30'46"E, 2°59'22"N, 19.VIII.2000, P. Derleth & R. Schlaepfer, 2 larvae. – B0113, Langap Sud, Rian River, Belakau, 116°30'26"E, 3°04'04"N, 20.IV.2001, P. Derleth & M. Sartori, 2 larvae. – B0833, Seturan, Seturan River, Temalat, 116°33'29"E, 2°59'29"N, 16.IV.2001, P. Derleth & M. Sartori, 1 larva. – B1413, Seturan, Seturan River, tributary, 116°33'29"E, 2°58'54"N, 24.IV.2001, P. Derleth & M. Sartori, 2 larvae. – B1513A, Seturan, Seturan River, tributary, 116°31'22"E, 2°59'49"N, 27.IV.2001, P. Derleth & M. Sartori, 1 larva.

Etymology

The new species is named in honour of Maria Sibylla Merian (1647–1717) who discovered and described metamorphosis in Insecta.

Description

Male subimago

Measurements and colouration

Body length 2.9–3.3 mm; wing length 1.8–2.0 mm. – Ratios of fore legs etc. cannot be given because only three subimagines are available whose fore legs are not finally developed.

Colouration of cuticle: Mesonotum, lateral parts of pronotum and anterior part of metanotum yellowish-brown; other parts yellowish.

Epidermal pigmentation: Frons and vertex strongly blackish-brown, with a transverse light line on vertex. Pronotum greyish-brown with light paramedian longitudinal dashes. All abdominal terga with transverse grey bands, intensity decreasing posteriorly; terga I–III with anteromedian black spots. Blackish spots in area of coxae and pleura. Diffuse greyish pigments in area of mouth part rudiments, base of antennae and fore legs.

Morphology

Head: Fore margin between lateral and frontal ocellus straight. Base of antennal flagellum dilated, dilated part about 1.2 times as long as and less than half as wide as the pedicel, slightly converging and anteriorly more or less abruptly narrowed.

Thorax: Prosternal ridges straight (sometimes slightly concave), anteriorly converging, forming a broad trapezoid, fore margin and transverse chitinous strip lacking (Fig. 7c). Segments of fore tarsus without apical projections.

Abdomen: Lateral filaments of abdominal segments very short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 7a. Penis with rounded lobes. Styliger sclerite rectangular, with concave anterior margin between long and strong apophyses. Lateral sclerites short, inconspicuous. Forcipes long and slender, sides of median part nearly parallel, apically slightly converging, base weakly broadened; apical tuft consisting of about 5 weakly coiled spines (Fig. 7b). A well-developed forceps muscle inserts at the thickened inner margin of the forceps base.

Female imago unknown.

Egg

Eggs (from a female last instar larva) elongated, about twice as long as wide, with a cap-shaped epithema (Fig. 29). Chorion with densely set, relatively large pores covered by a fine network (maybe the rest of a covering

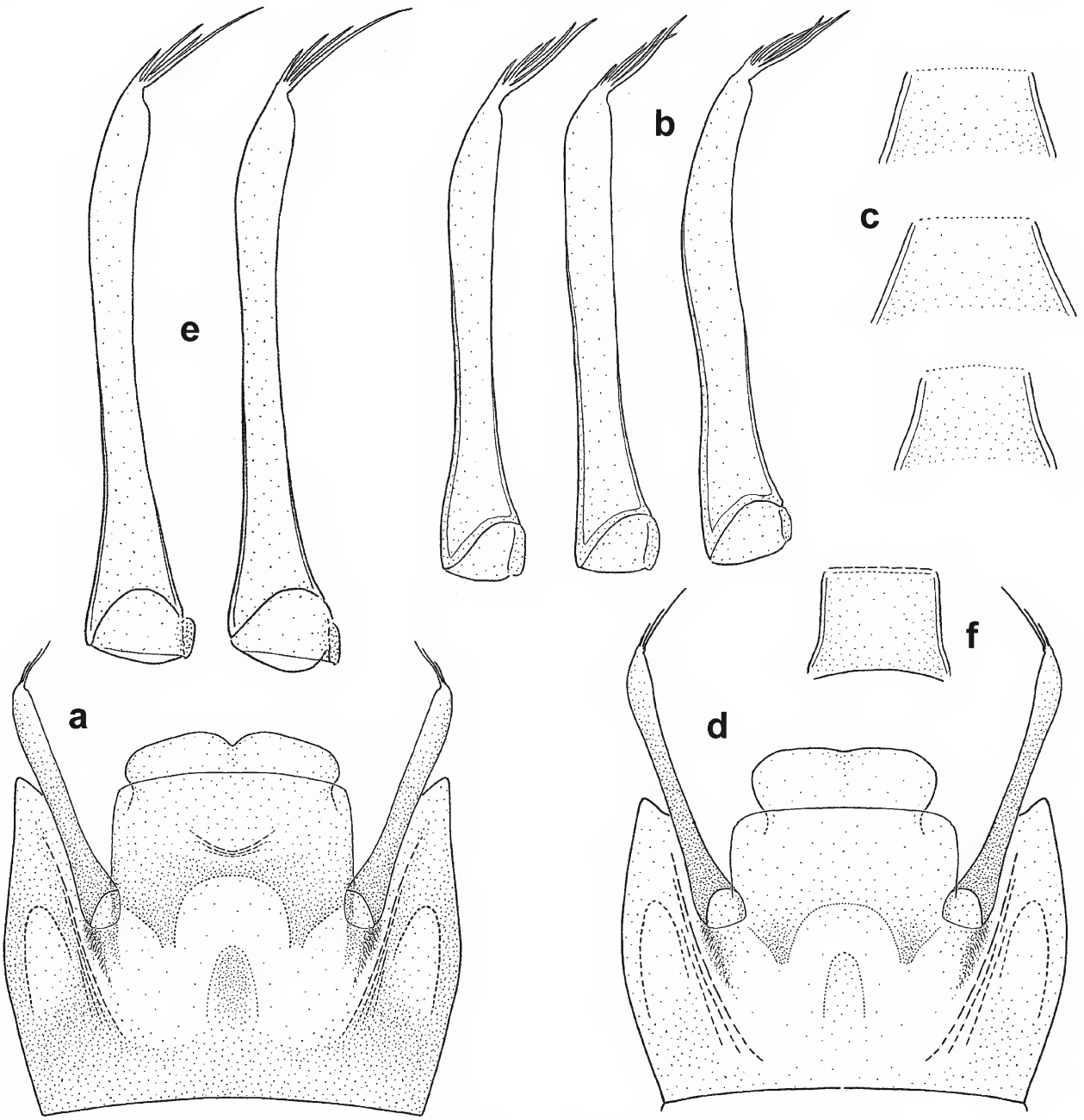


Fig. 7. *Kalimaenis sibylliana* n. sp., ♂ (a–c) and *K. staniczeki* n. sp., ♂ (d–f). – **a**, **d**. Genitalia. **b**, **e**. Different shape of forcipes. **c**, **f**. Prosternal trapezoid.

layer that will be no longer present in adult eggs). One very short micropyle with circular sperm-guide (Fig. 30).

Larva

Measurements and colouration

Male larva of last instar, body length 2.8–3.0 mm, length of cerci 1.5–1.8 mm; female larva of last instar, body length 4.5 mm, length of cerci 2.5 mm.

Colouration of cuticle: Yellowish-brown.

Epidermal pigmentation: Apart from eyes and ocelli no pigments visible.

Morphology

Body slender and narrow (Fig. 31). Surface: Dorsal and ventral side strongly granulated, head and thorax mainly with round knobs, posterior parts with rounded triangular structures or small denticles; femora with a scaly sur-

face. Because of this structure all outlines of the body are strongly granulated or denticulated.

Head: Surface of clypeus and frons slightly bumpy; with longitudinal median ridge (Fig. 32). Genae clearly bulging out. Clypeus slightly protruding anteriorly, protrusion with straight fore margin, without setation (Fig. 32). Labrum with broadly rounded corners, anterior margin with median indentation. Mandibles without setation. Maxillary palp very slender, segment I apically converging, segments II and III coiled (Fig. 12a). Segment III of labial palp very short, with oblique dividing line to segment II; segment I short and round (Fig. 12b).

Thorax: Pronotum broadly rectangular, lateral sides parallel, straight or slightly concave, fore corners protruding anteriorly; fore and hind margin in dorsal view straight and parallel (Fig. 32). Mid and hind coxae with short processes, with scaly surface (Fig. 8a). Legs, particularly of female larvae, narrow and slender (Figs. 8b–d). Fore legs clearly shorter than hind legs. Femora and tibiae of mid and hind legs with very short spatulate marginal bristles; dorsal surface of femora with a few spatulate bristles of the same size or slightly longer. About 4 or 5 slightly longer bristles forming a transverse row on fore femur (Fig. 8b). Fore and mid tarsus ventrally with inner row of about 8–10 thin and pointed bristles, the apical one more or less pinnate. Hind tarsus with inner row of about 10 thin and pointed bristles and outer row of 4–5 unipinnate bristles, pinnae directed medially; both rows are very near and tend to merge with each other. Claws slender and scarcely bowed; fore and mid claws without denticulation; hind claws with groups of micro-denticles fused together (Figs. 8e, f).

Abdomen: Abdominal segments with short posterolateral processes; process of segment II clearly longer (Figs. 8j–l). Lateral bristles short or very short and spatu-

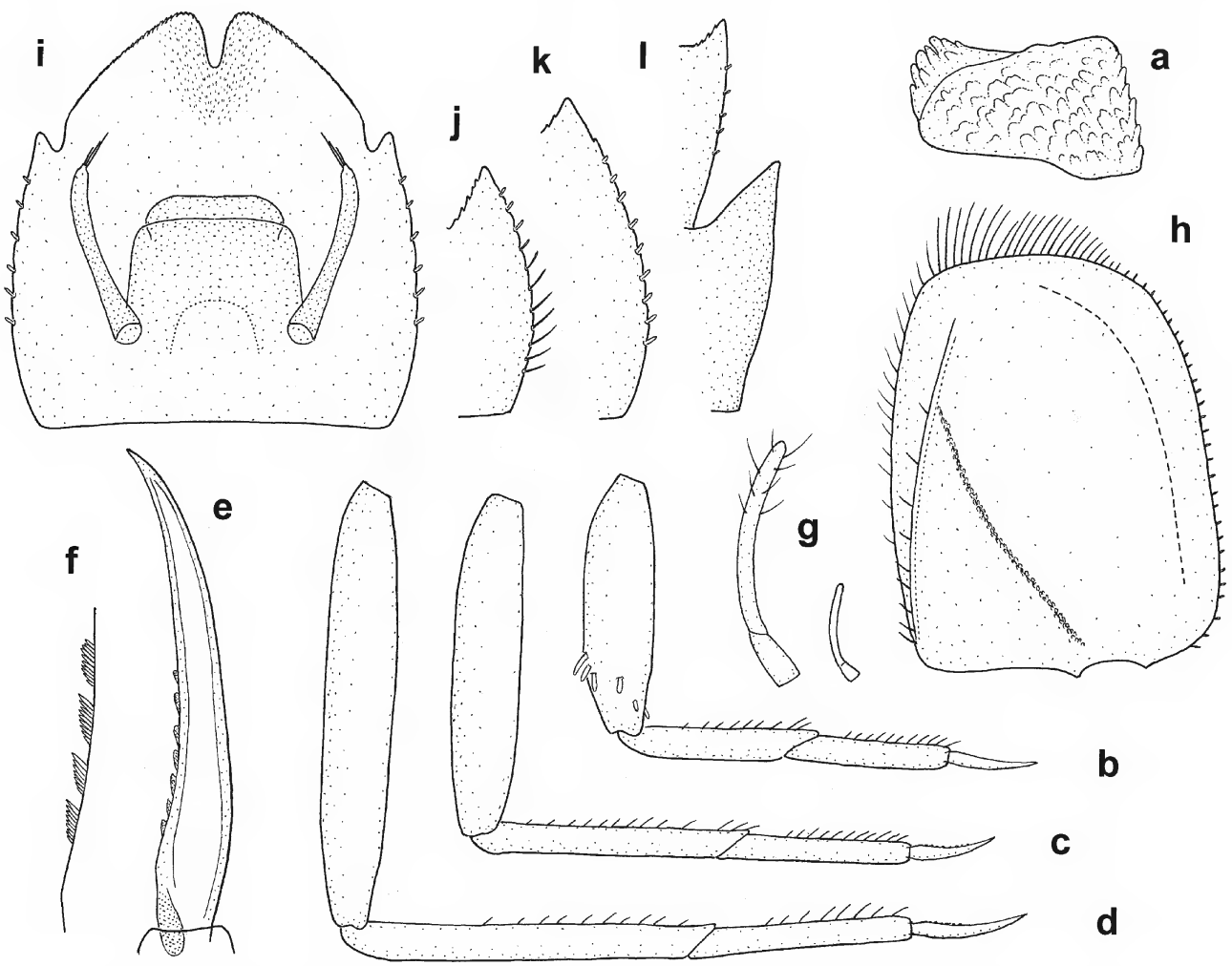


Fig. 8. *Kalimaenis sibylliana* n. sp., larva. – **a**. Coxal process of hind leg. **b**. Fore leg, ♂. **c**. Hind leg, ♂. **d**. Hind leg, ♀. **e**. Claw of hind leg. **f**. Claw of hind leg, inner margin with groups of micro-denticles, higher magnification. **g**. Gill I. **h**. Operculate gill (same magnification as gill I). **i**. Sternum IX, ♂, with subimaginal genitalia. **j**. Marginal setation of abdominal segment V. **k**. Marginal setation of abdominal segment VII. **l**. Margin of abdominal segments II and III.

late, with close-fitting micro-trichoma (Fig. 33), slightly longer on segments IV and V (VI); segments I–III with very short spatulate bristles or without (Figs. 8i–l). Posteriomedian process of tergum II of moderate length, triangular and pointed. Hind margin of terga VII–X strongly denticulated, tergum VII additionally with very short spatulate bristles. Hind margin of sternum IX domed, with a very deep and narrow indentation which is surrounded dorsally by a large shagreen field consisting of micro-spines or denticles (Fig. 8i). Gill I (Fig. 8g) very short, about one-fourth length of gill-cover. Operculate gills with very short spatulate bristles on lateral margin (like those on lateral margins of abdominal segments), changing to longer pointed bristles on hind margin of the gills (Fig. 8h). The short bristles have close-fitting micro-trichoma (Fig. 33), the longer ones numerous fine threads which are catenated with those of the neighbouring bristles similar to radii of a bird feather (Fig. 34). Y-shaped ridges well-developed, connected together posterior to the middle of the gill; medial ridge moderately keeled with about 10 blunt bristles at the base of the keel (Figs. 8h, 33, small frame). Ventral row of microtrichia not reaching the middle of the hind margin of the gill (Figs. 8h, 35). Microtrichia scale-shaped, nearly as well-developed as in Caenini (Fig. 36). Base of the row also with clusters and single spines (Fig. 36, small frame), the latter can be found on nearly the whole ventral surface. Number of filaments on gills III–VI reduced; gill III with 28 filaments (35–60 in other *Caenis* species) and only about 7 filaments with 3 or more branches (14–26).

Remarks

The assignment to the males is based on a larva with visible subimaginal genitalia, showing the characteristic shape of forcipes and prosternal ridges.

Kalimaenis staniczeki **n. sp.**
(Figs. 7d–f)

Holotype, ♂ SI (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 20.IV.2001, P. Derleth & M. Sartori.

Etymology

I dedicate the new species to my colleague and dear friend Arnold H. Staniczek (Stuttgart) for his kind help and cooperation.

Description

Male imago

Measurements and colouration

Body length 3.0 mm; wing length 1.7 mm. – Ratios of fore legs etc. cannot be given because only one subimago is available whose fore legs are not finally developed.

Colouration of cuticle: Mesonotum beige, with marginal yellowish-brown bands; pronotum yellowish; abdomen white.

Epidermal pigmentation: Frons and vertex dark brown. Pronotum greyish-brown with light marks and dashes. Scutellum greyish shaded. All abdominal terga with broad transverse grey bands, intensity increasing posteriorly. Blackish spots in area of coxae and pleura. Diffuse greyish pigments on ventral side, anterior mesosternum, prosternum, area of mouth part rudiments, base of antennae, and fore legs.

Morphology

Head: Fore margin between lateral and frontal ocellus slightly convex. Base of antennal flagellum dilated, dilated part nearly as long as and one-third as wide as the pedicel, sides evenly converging.

Thorax: Prosternal ridges forming a square (sides posteriorly slightly diverging); transverse chitinous strip lacking (Fig. 7f). Segments of fore tarsus without apical projections. Mesonotum and median notal membrane elongated; anterior parapsidal sutures nearly invisible; scutellum relatively short and small.

Abdomen: Lateral filaments of abdominal segments very short. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 7d. Penis with short, broadly rounded lobes (in contrary to the other genital structures, the subimaginal penis often does not show its final shape). Styliger sclerite rectangular, with concave anterior margin and short and broad apophyses. Lateral sclerite invisible. Basolateral sclerite basally broadened, weakly longitudinally ridged. Forcipes very long and slender, apically slightly, at the base strongly broadened; apical tuft consisting of a very long and slightly curved spine and 3–4 clearly shorter spines (Fig. 7e). A strongly developed forceps muscle inserts at the thickened inner margin of the forceps base.

Female and larval stage unknown.

3.3 Genus *Clypeocaenis* Soldán, 1978

The genus can be characterised and distinguished from all other genera of Caenidae by the following combination of characters:

Imago. Prosternum with ridges forming a triangle or trapezoid. – Forceps without longitudinal folds or ridges. – Forceps morphologically and functionally not fused together with the styliger plate. – Without a functional unit of forceps, forceps muscle and enlarged lateral sclerite.

Egg. Chorion without longitudinal grooves or rowed structures.

Larva. Head without ocellar tubercles. – Clypeus anteriorly protruding, protrusion with two or more long and strong bristles. – Mandibles with a group or two transver-

sal rows of long setae. – Maxillary palps two-segmented, labial palps three-segmented. – Segment III of labial palp very long and conical, 3–4 times as long as the short segment II. – Fore tibia with two rows and fore tarsus with one row of very long filtering bristles. – Femora without extended plates. – Operculate gills ventrally with a band or row of microtrichia, ending far away from hind margin of gill. – Nearly all filaments on gill III (IV–V) two-branched or simple. – Lateral spines of abdomen not bent dorsally. – Posterior part of sternum IX dorsally with shagreen field. – Abdominal terga VII–IX without mediolongitudinal ridge. – Hind margin of sternum IX without a bi-pointed process with concave margin between the points.

Clypeocaenis soldani **n. sp.**
(Figs. 9, 12c, d, 13h, 37–44, 47)

Holotype, ♂ larva (on microslide): B0213, Seturan, Seturan River, Temalat, 116°32'24"E, 3°00'10"N, 27.III.2001, P. Derleth.

Paratypes: Same data as holotype, 12 larvae.

Other material: B0121, Langap Sud, Rian River, Belakau, 116°30'26"E, 3°04'04"N, 7.VII.2000, P. Derleth, 1 larva. – B0513, Seturan, Seturan River, Tamalang, 116°30'29"E, 2°59'22"N, 10.IV.2001, P. Derleth, 2 larvae. – B0541, Seturan, Seturan River, Bengahau, 116°30'46"E, 2°59'22"N, 19.VIII.2000, P. Derleth & R. Schlaepfer, 1 larva. – B0533, same locality, 11.IV.2001, P. Derleth & B. Feldmeyer, 4 larvae. – B1013, Seturan, Rian River, tributary, 116°32'16"E, 3°00'57"N, 30.III.2001, P. Derleth, 5 larvae. – B1211, Langap Sud, Rian River, tributary, 116°31'05"E, 3°01'40"N, 11.VII.2000, P. Derleth, 4 larvae.

Etymology

The species is dedicated to Dr. Tomáš Soldán (České Budějovice, Czech Republic) who described the genus *Clypeocaenis* for the first time.

Description

[Male imago]

Among the studied larvae there are two male final instars so that at least genitalia, arrangement of prosternal

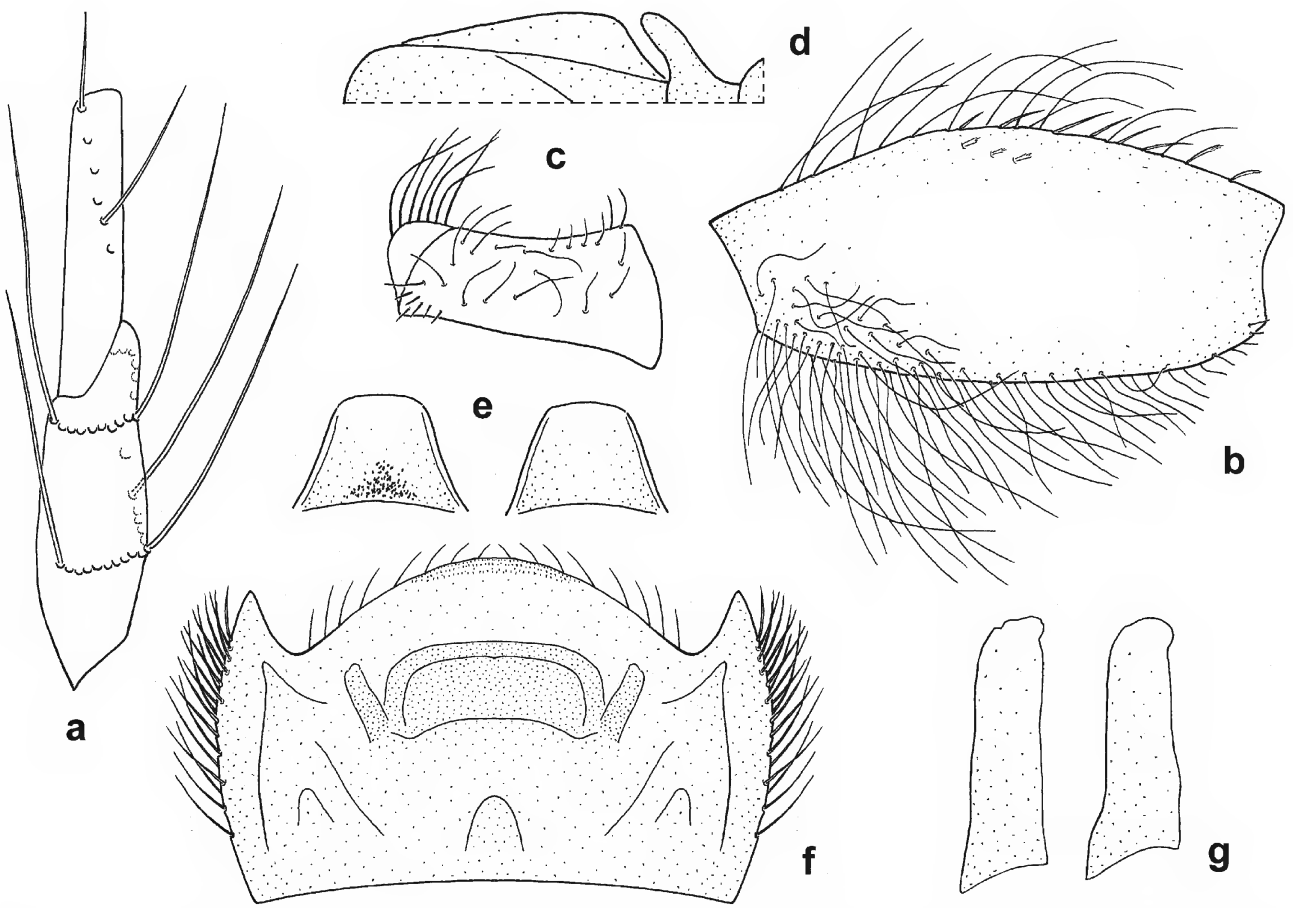


Fig. 9. *Clypeocaenis soldani* n. sp., larva. – **a**. Tibia and tarsus of fore leg, with insertions of filtering setae (explanation see text). **b**. Setation of hind femur. **c**. Coxal process of hind leg. **d**. Posteriomedian process of tergum II and operculate gill, lateral view. **e**. Prosternal trapezoids from last instar larva. **f**. Sternum IX, ♂, with subimaginal genitalia. **g**. Forcipes from subimaginal genitalia.

ridges, shape of antenna and epidermal pigmentation of the otherwise unknown males can be described:

Vertex with grey hind margin and a transverse band between lateral ocelli. Hind margin of pronotum greyish. Abdominal terga with transverse grey bands, on tergum II–VII medially intensified. Prosternum with a median blackish-grey spot; sutures and a median line of mesosternum pigmented. Abdominal sterna I–VII with medial grey spots.

Base of antennal flagellum moderately dilated. Prosternal ridges forming a trapezoid with straight or slightly convex lateral sides, anteriorly open or weakly rounded (Fig. 9e). Sternite IX and subimaginal genitalia as in Fig. 9f. Forcipes short with more or less parallel sides and rounded apex, often with a small apico-medial bump (Fig. 9g).

Larva

Measurements and colouration

Male larva of last instar, body length 3.3–3.5 mm, length of cerci 1.5 mm; subadult female larva, body length about 5 mm, length of cerci about 2 mm.

Colouration of cuticle: Yellowish- or reddish-brown.

Epidermal pigmentation: Vertex with transverse greyish band between lateral ocelli. Abdominal terga with broad transverse greyish bands (Fig. 47, left).

Morphology

Body flat and very broad (Fig. 47). Surface: Dorsal side and femora strongly granulated. More or less covered with multibranched bristles (Fig. 37) and often with so-called sausage-shaped bristles with many thin and irregularly arranged and matted branches (Figs. 38, 39). There are all transitional stages to bristles with only short or very short branches on different places of the body surface e. g. the lateral outline (compare *Caenis abdita*, section 3.1).

Head: Surface of clypeus and frons slightly bumpy. Genae clearly bulging out, outline notched. Clypeus protruding anteriorly, protrusion rounded, with 20–35 long bristles which are more or less covered with matted branches (Fig. 39). Mandibles with a dorso-lateral group of about 15 long bristles, only the basal ones in a curved row, the others irregularly arranged. Galea-lacinia very broad, with a long row of about 10 bristles on inner margin. Segment II of maxillar palp with very dense setation along the inner margin, except on the basal third (Fig. 12c). Segment III of labial palp cone-shaped, 3.5–3.8 times as long as segment II.

Thorax: Pronotum with slightly convex sides, anteriorly more or less converging (Fig. 47). Mesonotum marginally with long and very thin, irregularly curved bristles. Fore tibia (Fig. 40) with two transverse rows of very long filtering setae on dorsal side which are prolonged on ventral side in longitudinal direction; on tarsus another scattered row extending nearly longitudinally (Fig. 9a). Fore femur short and broad, with a transverse band of numerous blunt or spatulate bristles (Fig. 41), long pointed bristles on outer margin and about 4 very long filtering setae on inner margin. Coxal processes semi-elliptical, with very long thin bristles (Fig. 9c). Tufts of about 20 long and thin bristes anteriorly on mid and hind coxae. Femora of mid and hind legs with very long hair-like marginal bristles (Fig. 9b). Marginal bristles on mid and hind tibiae slightly shorter and stronger. Fore tarsus ventrally with inner row of about 7 thin and pointed bristles; mid tarsus with inner row of 5 slightly shorter and weaker bristles; hind tarsus with inner row of about 7 pointed bristles and outer row of 5 bipinnate bristles. Some bipinnate bristles also apico-ventrally on hind tibia. Claws hooked, with about 5 strong denticles. Hind claws homodont (without additional row of very fine micro-denticles).

Abdomen: Posterior abdominal segments with moderate strongly curved postero-lateral processes; processes of segments III–V (VI) very short and broadly rounded, of segment II long and triangular. Lateral bristles long, numerous, densely set (Fig. 9f). Posteriomedian process of tergum II long, triangular, cone-shaped in lateral view (Fig. 9d). Hind margin of terga VII–X strongly denticulated, tergum VII additionally with moderate spatulate bristles. Sternum IX very broad with hind margin flatly rounded; a narrow shagreen band consisting of 2–3 rows of micro-denticles extends very close to the hind margin (Fig. 9f). Gill I short, one-fourth to one-third length of gill-cover. Operculate gill broad (Fig. 42), with bristles of moderate length on lateral margin and shorter, broader and frayed ones on hind margin; inner margin with very thin bristles. Medial ridges strongly developed, forming an elevated triangular keel (Figs. 9d, 43), basally with 7–8 strong bristles; outer oblique ridge formed by a row or narrow band of strong granules. A band of microtrichia on ventral side extends along the lateral margin ending far from hind margin (Fig. 42), consisting of simple spines on lateral side and clusters of 2–6 spines medially (Fig. 44). Gills III (–V) with only 1 filament with 3 branches; all other filaments (35–40 or more) simple or two-branched.

Differential diagnosis

Clypeocaenis soldani can be distinguished from all other *Clypeocaenis* species by the following combination of characters: Larva flat and very broad. Surface with multibranched bristles. Protrusion of clypeus rounded, with 20–35 long bristles which are more or less covered with matted branches. Mandibles with a dorso-lateral group of about 15 long bristles, not arranged in straight rows. Anterior margin of fore femur with about 4 long bristles. Operculate gill with a band of microtrichia on ventral side consisting of simple spines and clusters of 2–6 spines.

3.4 Genus *Tigrocercus* Malzacher, 2006

The genus can be characterised and distinguished from all other genera of Caenidae by the following combination of characters:

Imago. Fore coxae widely separated; prosternum broad, with two transverse ridges. – Trochanter of fore leg elongated. – Metanotum flat, without transverse ridge, with membranous hind margin. – Abdomen with very long lateral filaments, at least on segments V–VII. – Forceps long and sickle-shaped, apical half very narrow, with a longitudinal ridge, basal part strongly broadened. – Articulation of forceps to lateral sclerite more lateral. – Forceps morphologically and functionally not fused together with the styliger plate. – Forceps, forceps muscle and enlarged lateral sclerite forming a functional unit.

Egg. Chorion with longitudinal rows of scale like structures.

Tigrocercus nastassjae **n. sp.**
(Figs. 10a–d, 13i, 48)

Holotype, ♂ SI (on microslide): B1313PLM, Seturan, Seturan River, tributary, 116°30'48"E, 3°00'05"N, 17.IV.2001, P. Derleth & M. Sartori.

Etymology

The species is dedicated to my second grandchild, Nastassja.

Description

Male subimago

Measurements and colouration

Body length 3.0 mm; wing length 2.5 mm. – Ratios of fore legs etc. cannot be given because only one subimago is available whose fore legs are not finally developed.

Colouration of cuticle: Mesonotum yellowish-brown; other parts yellowish-white.

Epidermal pigmentation: Pigmentation of dorsal and lateral side as in Fig. 48. Head, pronotum and abdomen strongly pigmented; median suture of mesonotum black. On ventral side transverse blackish lines on hind margin of head and along the prosternal ridges. Mesosternum with a broad longitudinal band of diffuse grey pigments. Abdominal sterna with paramedian and sublateral greyish diffuse smudges; parasternal spots blackish and voluminous, paratergal ones inconspicuous. Pigments also on fore legs and cerci.

Morphology

Head: Both antennal flagella lost. [A specimen of a closely related species from Thailand (see discussion) has the antennal flagellum basally dilated.]

Thorax: Fore coxae widely separated, prosternum broad, with two transverse ridges, the posterior one partly doubled (Fig. 13i). Trochanter of fore leg elongated. Mesonotum in front of the short mesonotal membrane abruptly lowed. Metanotum without transverse ridge, with membranous hind margin.

Abdomen: Very long lateral filaments on abdominal segments V–VII, shorter ones on segment IV (Figs. 10c, 48). Abdominal terga I and II each with a median finger-like process (Fig. 10d).

Genitalia and sternum IX as in Fig. 10a. Penis with moderate broadly rounded lobes, with a median tongue-like structure and two paramedian rounded processes on ventral side. Styliger sclerite inconspicuous. Lateral sclerites parallel and moderately sclerotized, with weakly S-shaped keels. Forcipes long and sickle-shaped, apical half very narrow, with one or two longitudinal ridges, basal part strongly broadened, median part on inner margin irregularly toothed (Fig. 10b). A strongly developed forceps muscle inserts at the inner side of the forceps base.

Female imago and larva unknown.

Differential diagnosis

See discussion (section 5) and Tab. 3.

3.5 Genus *Oriobrachys* Sun & McCafferty, 2008

The genus can be characterised and distinguished from all other genera of Caenidae by the following combination of characters:

Imago. Pedicel about 2.3 times as long as scape, 2.5–2.8 times as long as wide. – Fore coxae widely separated, prosternum broad, with one transverse ridge, divided by two incisions. – Metanotum flat, without transverse ridge, with membranous hind margin. – Abdomen with very short lateral filaments on segments III–VI. – Sternite IX and genitalia elongated, medially waisted by concave lateral and basolateral sclerites. – Forceps grooved, very long and narrow; basal part broadened and covered by the styliger plate. – Apical part of forcipes not fused together with the styliger plate. – Forceps, forceps muscle and enlarged lateral sclerite forming a functional unit.

Larva. Operculate gill with a longitudinal ridge in the sublateral area. – Postero-lateral projection of abdominal segment VI distinctly curved medially. – Ocellar tubercles without long setae. – Pedicel about twice as long as scape, 3.5–3.7 times as long as wide. – Maxillary and labial palps two segmented. – Labial palp segment I with long setae ventrally. – Fore tibia without a row of long setae on the posterior surface. – Abdominal tergum II without a postero-medial process. – Operculate gill without a protruding edge at the postero-lateral corner. – Microtrichia

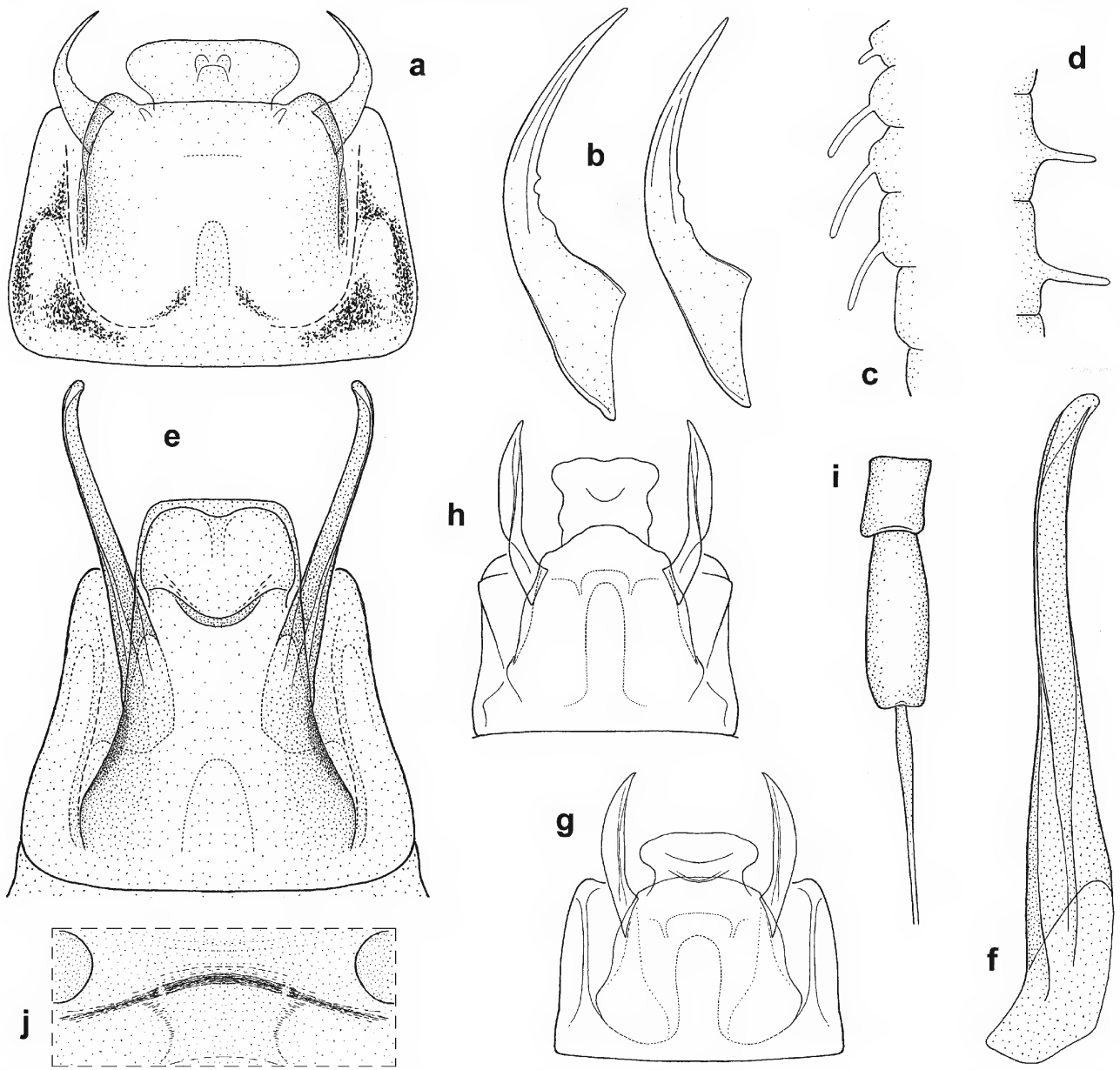


Fig. 10. *Tigrocercus nastassjae* n. sp., ♂ (a–d), *Oriobrachys* sp., ♂ (e–f, i–j), *Brachycercus harrisella* (g) and *Cercobrachys etowah* (h). – **a**, **e**, **g**, **h**. Genitalia. **b**, **f**. Forcipes. **c**. Lateral outline of abdomen with filaments. **d**. Abdominal terga I and II with finger-like processes, lateral view. **i**. Antennal scape, pedicel and base of flagellum. **j**. Prosternum.

on ventral side of operculate gill represented only by a few inconspicuous spines immediately on the posterior lateral margin. [All characters, except the last one, from Sun & McCafferty 2008.]

Remarks

The material contains one larva that shows the generic characters of *Oriobrachys* as described by Sun & McCafferty (2008). About 6 km from the locality where this larva was collected, four Brachycercinae male subimagines were found. The two localities are located in the immediate mouth region of two tributaries of the Seturan River, so it is likely that larva and imagines belong to the same species. The larva cannot be assigned clearly to *Oriobrachys mahakam* Sun & McCafferty 2008, so I describe it here as *Oriobrachys* sp. and only tentatively link it to the males.

Oriobrachys sp.
(Figs. 10e, f, i, j, 11, 12e, f, 49)

Material examined

B1313PLM, Seturan, Seturan River, tributary, 116°30'38"E, 3°00'05"N, 17.IV.2001, P. Derleth & M. Sartori, 1 ♂ SI. Same locality, 20.IV.2001, 3 ♂♂ SI. – B0821, Seturan, Seturan River, Temalat, 116°33'29"E, 2°59'29"N, 21.VI.2000, P. Derleth & J.-L. Gattolliat, 1 larva.

Description

Male imago

Measurements and colouration

Body length 2.5–3.3 mm; wing length 2.0–2.2 mm. – Ratios of fore legs etc. cannot be given because only subimagines are available whose fore legs are not finally developed.

Colouration of cuticle: Meso- and metanotum brown; head and pronotum yellowish-brown; abdomen yellowish-white.

Epidermal pigmentation: Pigmentation of dorsal and lateral side as in Fig. 49. Characteristic strong pattern of metanotum and abdominal terga. Ventral side with grey pigments on base of mouthparts rudiments, transverse prosternal ridge, anterior field of mesosternum, metasternum, and anterior abdominal sterna.

Morphology

Head: Rectangular (Fig. 49). Pedicel 2.3 times as long as scape, 3.5–3.7 times as long as wide. Base of antennal flagellum weakly dilated (Fig. 10i).

Thorax: Sides of pronotum parallel, anteriorly more or less bulging out (Fig. 49). Prosternum with a transverse ridge divided by two incisions in a median and two lateral segments (Fig. 10j). Mesonotum broad, scutellum posteriorly rounded.

Abdomen: Very short lateral filaments on segments III–VI. Without finger-like process on tergum II.

Genitalia and sternum IX as in Fig. 10e. Penis club-shaped with broad shaft (in contrary to the other genital structures the subimaginal penis often does not show its

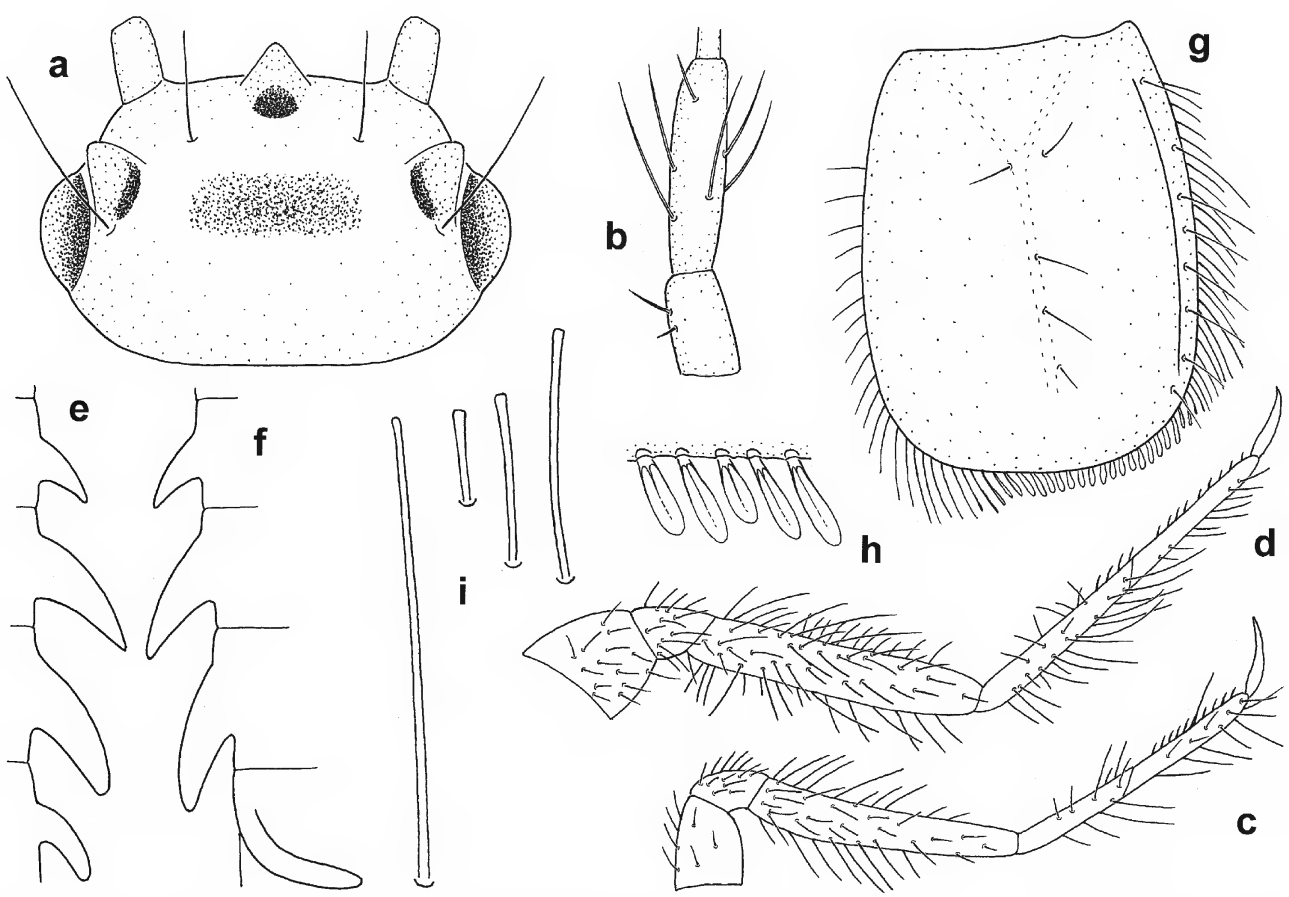


Fig. 11. *Oriobrachys* sp., larva. – **a**. Head, dorsal view. **b**. Antennal scape and pedicel. **c**. Fore leg. **d**. Hind leg. **e**. Abdomen with postero-lateral processes, lateral view. **f**. Abdomen with postero-lateral processes, dorsal view. **g**. Operculate gill. **h**. Bristles from hind margin of operculate gill. **i**. Bristles from legs and other parts of the body.

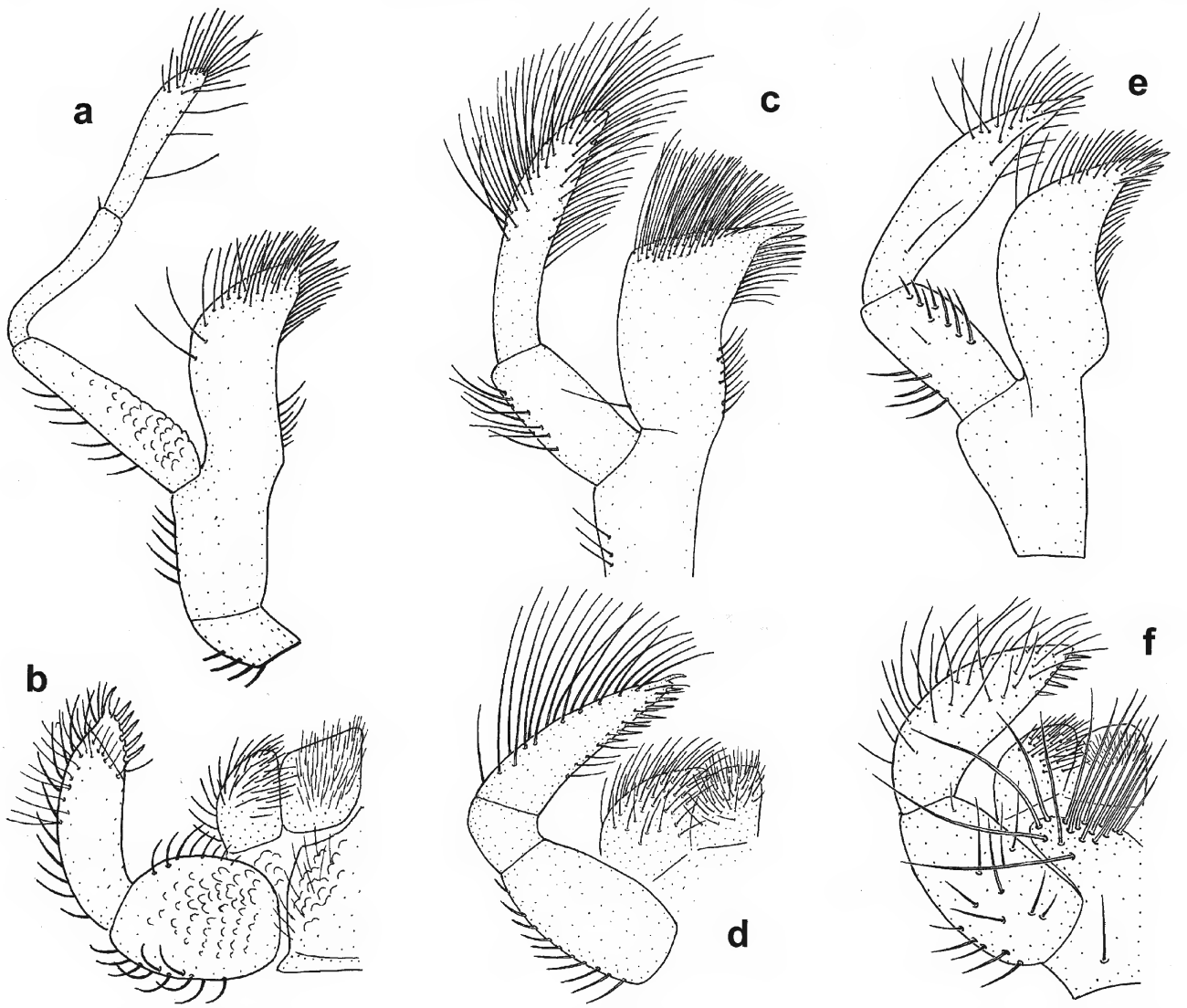


Fig. 12. *Kalimaenis sibylliana* n. sp. (a, b), *Clypeocaenis soldani* n. sp. (c, d) and *Oriobrachys* sp. (e, f), larva. – **a**, **c**, **e**. Maxilla. **b**, **d**, **f**. Labium.

final shape). Styliger sclerite with convex medial part of anterior margin and without apophyses. Because of the very elongated styliger plate, the anatomical details, particularly the styliger sclerite, are difficult to interpret. A medial strongly curved transverse structure could be the anterior or the posterior margin of the latter. Lateral and basolateral sclerites slightly bent and basally connected. Forcipes very long, narrow and tubular with the apex bent medially and rounded (Fig. 10f); the strongly broadened base covered by the lateral parts of the styliger plate. A strongly developed forceps muscle inserts at the inner side of the forceps base.

Female imago unknown.

Larva

Measurements and colouration

Female larva with small wing pads, body length 4.0 mm, length of cerci 1.0 mm.

Colouration and pigmentation: Apart from a transverse blackish band between the ocelli the pigmentation is not preserved (soft parts in beginning decomposition).

Morphology

Head (Fig. 11a): Ocellar tubercles shortly triangular, frontal tubercle pointed and slightly broader than long, the lateral ones apically broadly rounded; a very long bristle at base of lateral ocellus and a shorter one between lat-

eral and frontal ocellus. Pedicel about twice as long as scape, 3.5–3.7 times as long as wide; with about 10 bristles clearly longer than half the length of pedicel (Fig. 11b). Labrum nearly rectangular, with long apical bristles. Mandibles with a dorso-lateral row of long bristles. Maxilla and labium as in Figs. 12e, f. Prementum clearly outlined and slightly raised above level of glossae and paraglossae; antero-lateral part with very long and strong bristles, the longest as long as segment II of labial palp. Segment II of labial palp about as long as segment I, with inner margin slightly convex, apically narrowed, bluntly pointed and with about 11 very strong spines, 4–5 of them in an oblique row on dorsal side.

Thorax: Sides of pronotum with angled protrusion in anterior part. Proportions and setation of legs as in Figs. 11c, d. Tips of most bristles bluntly rounded, often slightly broadened (Fig. 11i) (those bristles can be found all over the body, in moderate length, particularly on the ventral side, together with very long pointed ones). Anterior bristles on mid and hind tarsi long and thin, slightly stronger and shorter on fore tarsi. Coxal processes not present.

Abdomen: Tergum II without a postero-medial process. Segments II–VI (Figs. 11e, f) with postero-lateral processes; process of segment II short, of segment VI long, tongue-shaped and strongly bent medially, nearly parallel on posterior margin of tergum VI; all processes with long, strong and blunt bristles. Lateral margins of segments VII–IX with a few short and blunt bristles. Gill I about two-thirds length of operculate gill. Operculate gill (Fig. 11g) with a sublateral ridge, area laterally from the ridge extending ventrally; ridge with 7–8 very long and pointed bristles. Lateral margin of gill with similar, slightly shorter bristles, changing to blunt bristles on posterior-lateral corner and short broadly spatulate ones on hind margin (Fig. 11h); on the inner hind corner the bristles are longer and thinner again. Y-shaped ridge hardly ascertainable.

4 New tribe Clypeocaenini

The description of the new Caeninae genus *Kalimaenis* is used as an opportunity to discuss the system of the subfamily Caeninae particularly the group of *Clypeocaenis*-like genera. McCafferty & Wang (2000) separated the genera *Clypeocaenis*, *Barnardara* and *Amercaenis* due to the synapomorphic character "fore legs and maxillary palps with filtering setae" as "clear monophyletic lineage" from the other Caeninae. The relationship among the three genera was not discussed. Kluge (2004) regards *Amercaenis* as sister group of the two other genera because of two synapomorphic characters of the latter: two-segmented maxillary palp and differentiated arrangement of filtering setae. Since 2004 three new Caeninae genera have been described namely *Callistellina* (Sun & McCafferty 2001, sub. *Callistina*), *Trichocaenis* (Malzacher 2009a) and the herein described *Kalimaenis* n. gen. Based on the synapomorphies discussed below, all these genera together

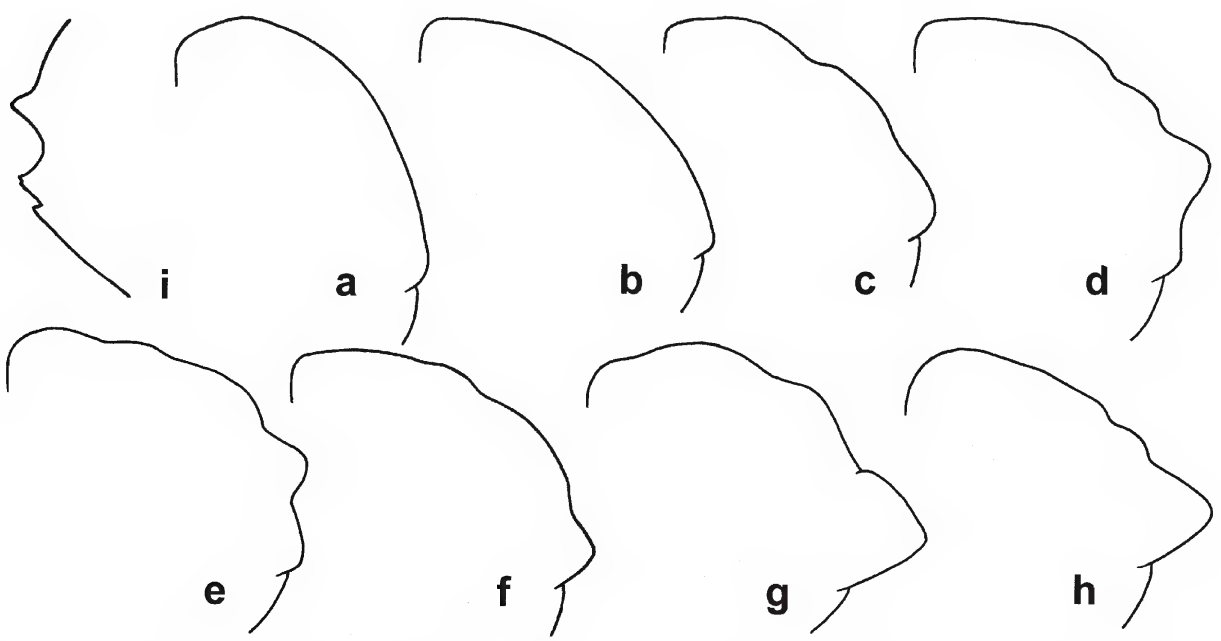
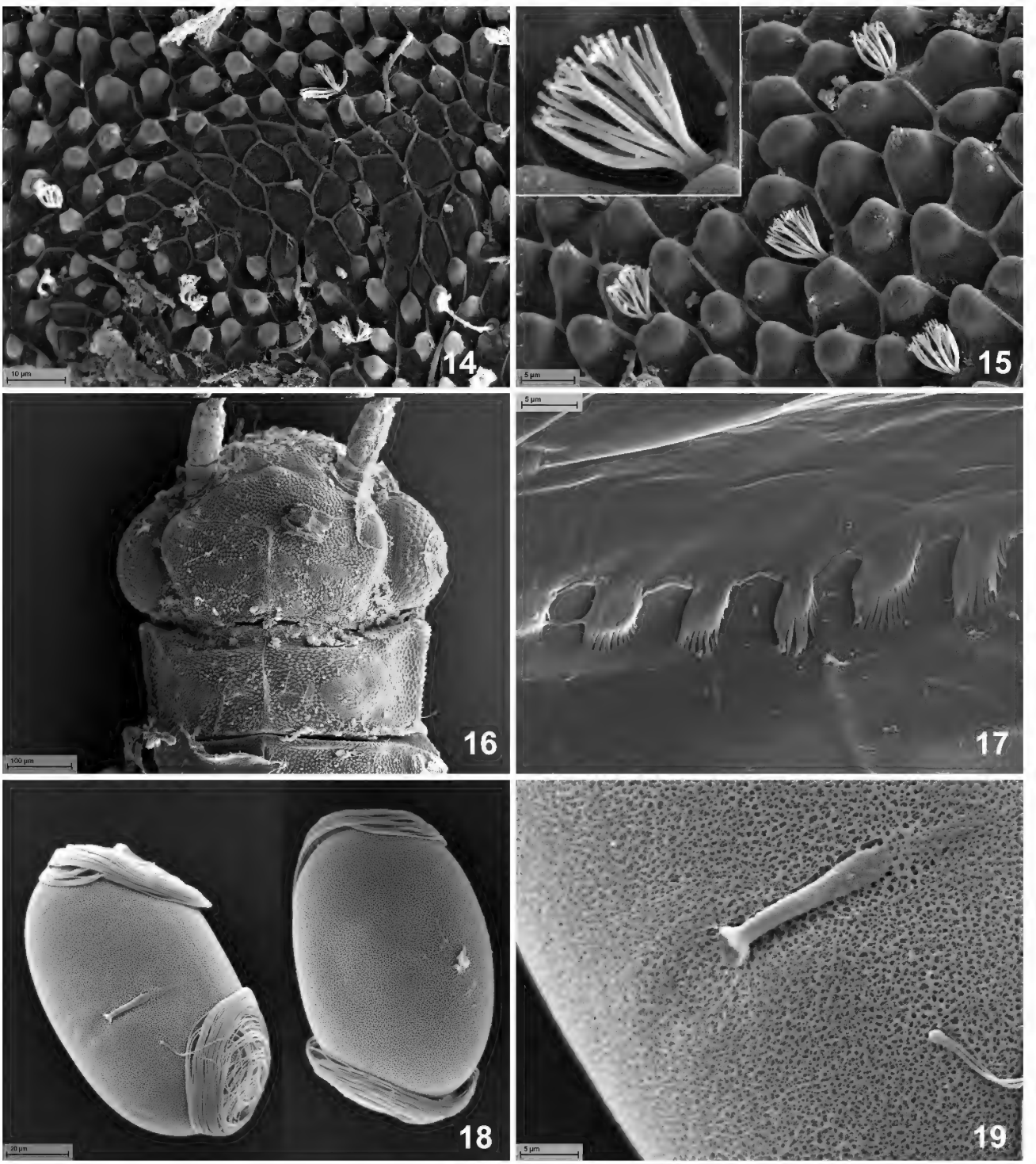


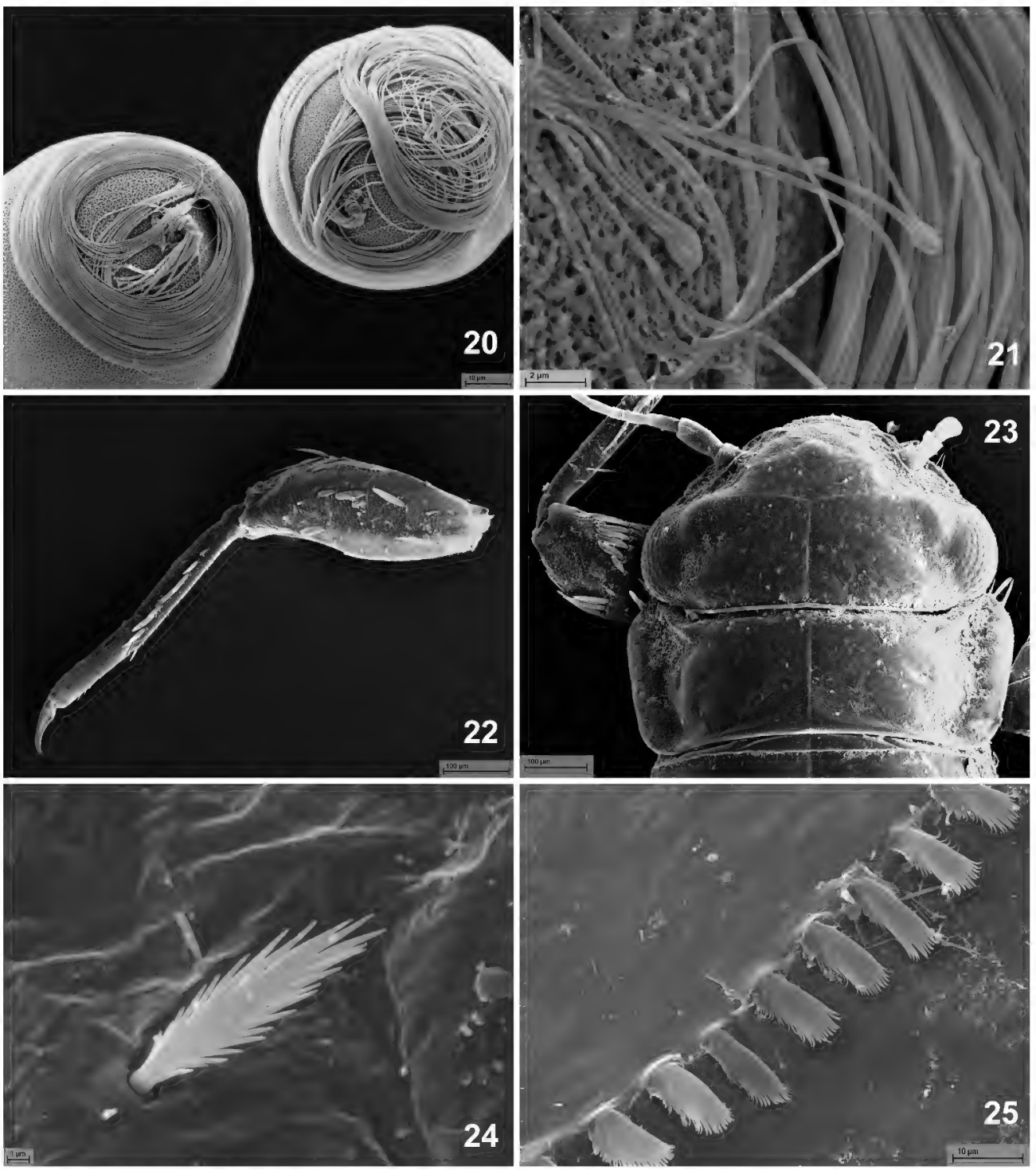
Fig. 13. *Caenis lactea* (a), *Caenis bidigitata* n. sp. (b), *Trichocaenis inexperta* (c), *Barnardara demoori* (d), *Kalimaenis sibylliana* (e), *Amercaenis ridens* (f), *Clypeocaenis afrosetosa* (g), *Clypeocaenis soldani* (h), *Tigrocercus nastassjae* (i). – **a–h**. Outlines of larval head, lateral view (body axis horizontal). **i**. Outline of imaginal prosternum, lateral view.

can be regarded as a monophyletic tribe of the subfamily Caeninae that has to be named Clypeocaenini, opposite to the tribe Caenini with the genera *Caenis*, *Afrocaenis*, *Brasilocaenis* and *Caenopsella*. A third tribe could be the Tasmanocoenini but its position within the phylogenetical system is still unclear.



Figs. 14–19. *Caenis fregatula* n. sp. (14–17) and *C. bidigitata* n. sp. (18–19). – **14**. Head, details of surface. **15**. Pronotal surface, details, with hand-shaped microtrichia (small frame: in high magnification). **16**. Head and pronotum. **17**. Operculate gill, microtrichia from ventral side. **18**. Egg. **19**. Egg, micropyle.

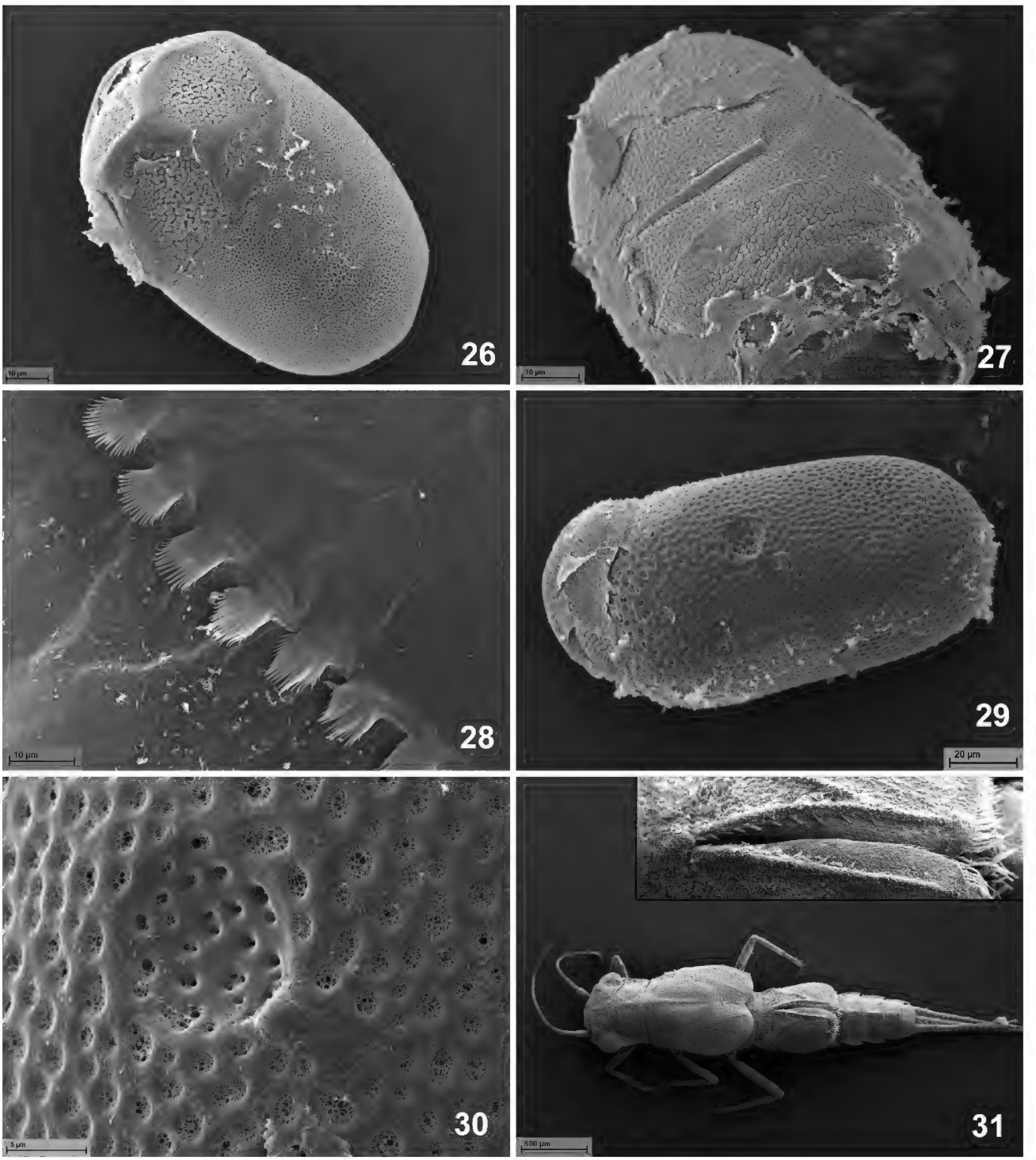
The herein suggested phylogeny of the Clypeocaenini genera (Fig. 50, Tab. 2) is discussed exclusively by using larval characters, since the adult stages (only known in one species of *Clypeocaenis* and in species of *Amercaenis* and *Kalimaenis*) are very *Caenis*-like without clear distinguishing characters.



Figs. 20–25. *Caenis bidigitata* n. sp., egg (20–21), larva (22–25) – **20**. Epithemata. **21**. Epithema, threads with terminal knobs. **22**. Mid leg, dorsal view. **23**. Head and pronotum. **24**. Operculate gill, frayed bristle from ventral side. **25**. Operculate gill, microtrichia from ventral side.

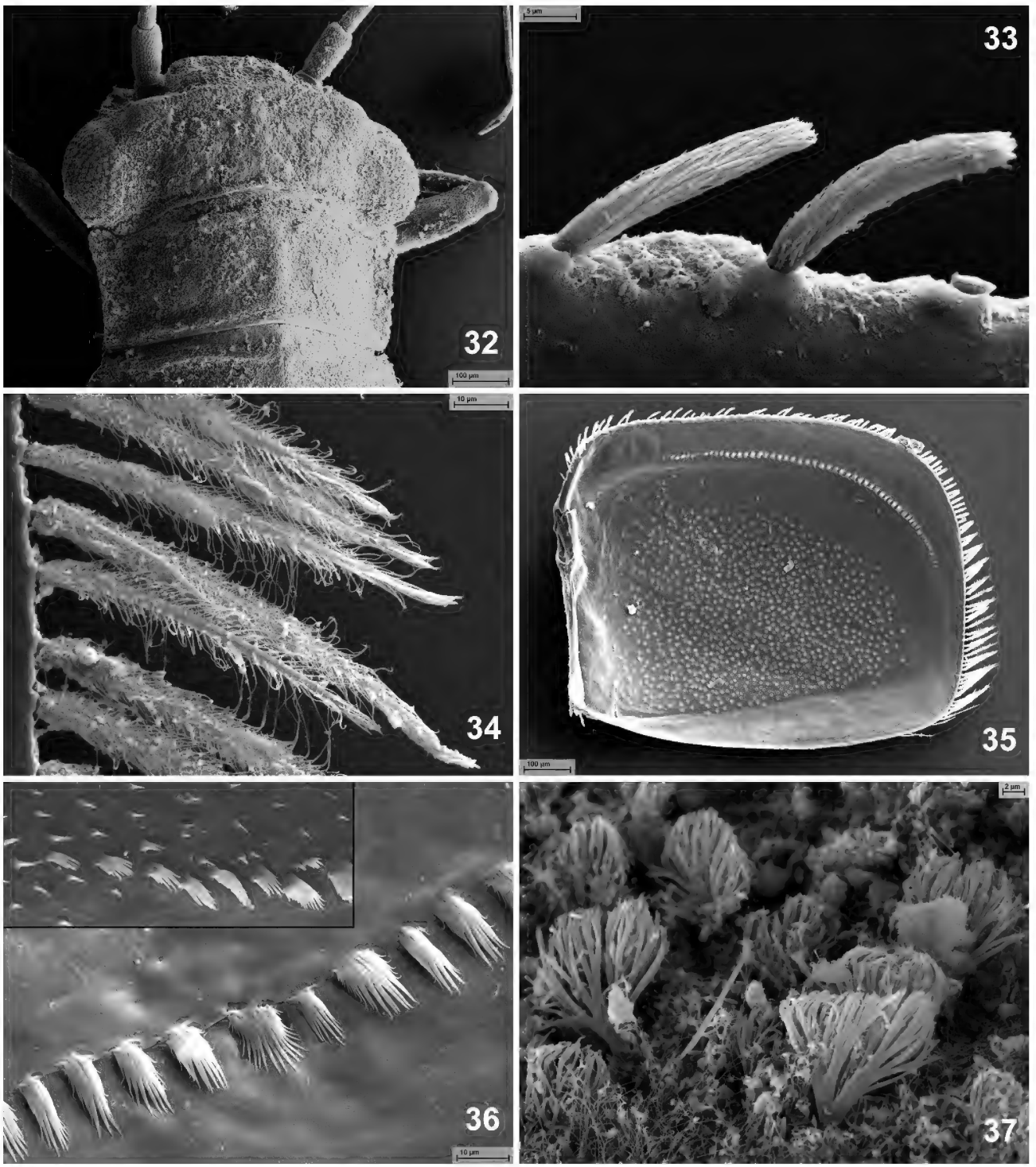
The new tribe Clypeocaenini (separated from the Caenini and Tasmanocoenini in bifurcation A) shows two synapomorphies:

(1) Gill III (first of the four respiratory gills) possesses at last 8 filaments with three or more branches, in most cases only one or two, in contrary to 15–25 in the Caenini and Tasmanocoenini. In the outgroup Neoephemeridae there are numerous filaments with 5 and more branches so that a reduction of these structures can be regarded as apomomorphic.



Figs. 26–31. *Caenis abdita* n. sp. (26–28), *Kalimaenis sibylliana* n. sp. (29–31). – **26**. Egg. **27**. Egg, micropyle. **28**. Operculate gill, microtrichia from ventral side. **29**. Egg. **30**. Egg, micropyle. **31**. Larva; keeled medial ridge on operculate gill in small frame.

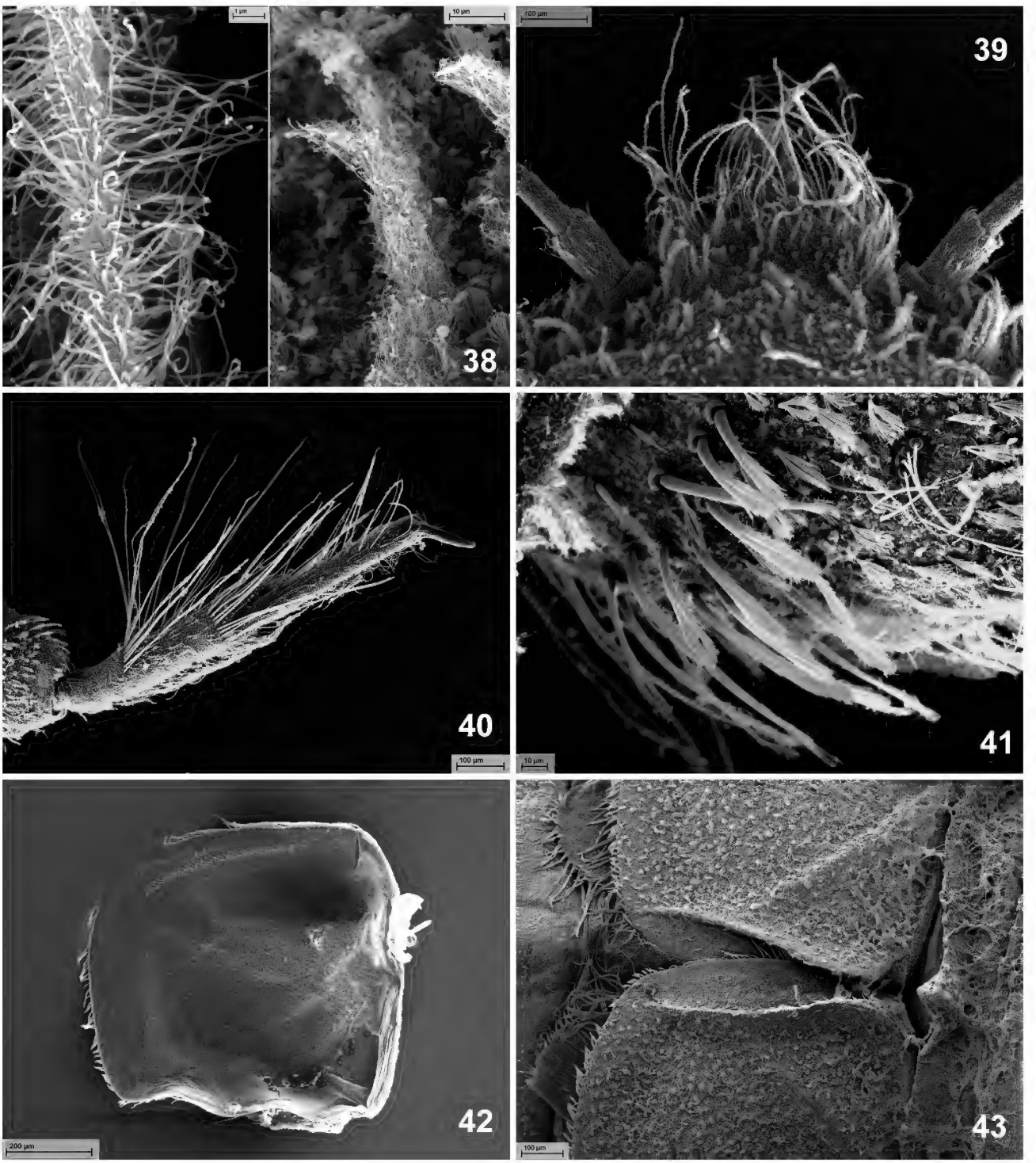
(2) Outline of head, seen in lateral view, with bulges, clypeus more or less protruding (Figs. 13c–h). In the Caenini as well as in outgroups Neoephemeridae (*Potamanthellus*) and Ephemerellidae (*Ephemerella*) the outline of the head, in lateral view, is evenly bowed (Figs. 13a, b).



Figs. 32–37. Larvae of *Kalimaenis sibylliana* n. sp. (32–36) and *Clypeocaenis soldani* n. sp. (37). – **32**. Head and pronotum. **33**. Operculate gill, bristles from lateral margin. **34**. Operculate gill, bristles from hind margin. **35**. Operculate gill, ventral view. **36**. Operculate gill, microtrichia from ventral side, sector from the row; basal part of the row in small frame. **37**. Multibranched hand-shaped bristles from body surface.

In the sister group, represented by the tribes Caenini and Tasmanocoenini, there are also two synapomorphies:

(3) Row of microtrichia on ventral side of gill II reaches hind margin of the gill (Caenini, see MALZACHER 2009b: figs. 17, 20, 23 and Tasmanocoenini, see SUTER 1984: fig. 6; ALBA-TERCEDOR & SUTER 1990: fig. 19; SUTER 1993: figs. 16, 41, 68; SUTER 1999: fig. 95).



Figs. 38–43. *Clypeocaenis soldani* n. sp., larva. – **38**. Body surface, sausage-shaped bristles (right), sector of a bristle from clypeus (left). **39**. Clypeus protrusion. **40**. Fore tibia and tarsus with filtering setae. **41**. Bristles from transverse row on fore femur. **42**. Operculate gill, ventral view. **43**. Operculate gill with keeled ridges, dorsal view.

(4) Gill II (operculate gill) with regular row of complex, very similar scale-shaped microtrichia. The plesiomorphic character state shows very different developmental stages (MALZACHER 2009b: figs. 3, 4, 5, 8, 10, 12).

Fig. 44. *Clypeocaenis soldani* n. sp., larva, operculate gill, microtrichia from ventral side.

Within Clypeocaenini the bifurcation B separates the *Amercaenis* group with the genera *Amercaenis* and *Kalimaenis* from the genera *Clypeocaenis*, *Barnardara*, *Callistellina* and *Trichocaenis* that share two apomorphies:

(5) In gill III nearly all filaments (up to 45) have one or two branches. Only one or two apical filaments show three or more branches. In the *Amercaenis* group there are 7–8 filaments with up to 5 branches and only about 20 reduced ones.

(6) Mesonotum broadened and outline of body more or less evenly curved.

As already supposed by KLUGE (2004), *Amercaenis*, now the *Amercaenis* group, does not seem to be defined by unique apomorphic characters. Within this group the genus *Kalimaenis* shows three apomorphic characters:

(8) Legs long and slender (Figs. 8b–d), particularly in the females, with narrow femora more or less parallel-

Figs. 45–46. *Caenis* spp. – **45**. *C. sebastiani* n. sp., ♂, dorsal view (left), lateral view (right). **46**. *C. abdita* n. sp., larva, dorsal view.

sided. This shape shows a certain similarity to legs of Brachycercinae. The fore legs of *Kalimaenis* are reduced in length just like in the latter subfamily.

(9) Maxillary palps strongly elongated and narrowed with a conical segment I and S-shaped coiled segments II and III (Fig. 12a). As far as I know this shape is unique in

Figs. 47–49. Caenidae spp. – **47**. *Clypeocaenis soldani* n. sp., larva, light microscope (left), SEM (right). **48**. *Tigrocercus nastassjae* n. sp., ♂, dorsal view (left), lateral view (right). **49**. *Oriobrachys* sp., ♂, dorsal view (left), lateral view (right).

the Caenidae or even in the Pannota, where a tendency of reduction can be observed in all families. Only in *Tricorythus* a long and slender maxillary palp can be observed, but it shows only two segments (McCafferty & Wang 2000: fig. 85).

(10) Hind claws with about 7 groups of micro-denticles fused together to larger denticles (Figs. 8e, f). In the Caeninae homodont and heterodont hind claws can be found. The former show a number of denticles equal in size, whereas the latter have an additional row of more or less fused microdenticles (e. g. Malzacher 2009b: figs. 1p, 2h, 3g), a state that is apomorphic in some Caenini but can not be found in the Clypeocaenini. Groups of fused micro-denticles are unique in *Kalimaenis*.

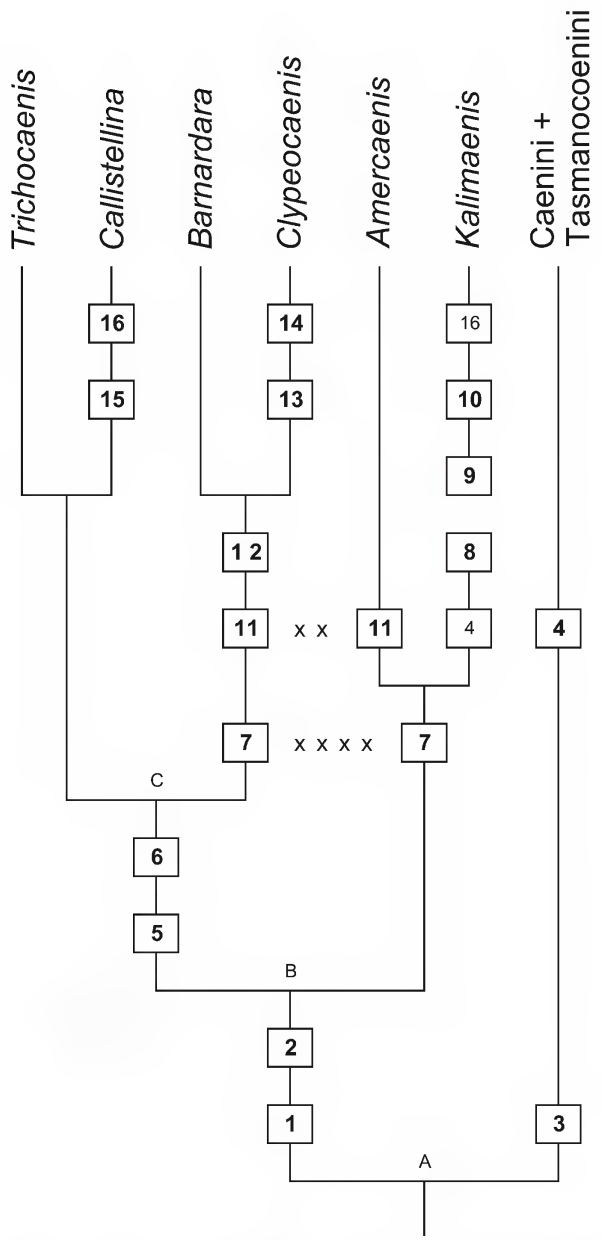


Fig. 50. Phylogeny of the tribe Clypeocaenini. – For explanation see discussion (section 5).

The remaining part of the phylogenetical tree comprises two groups of two genera each (separated in the bifurcation C). The genera *Clypeocaenis* and *Barnardara* share three apomorphic characters:

(7) Gill II with inner ridge keeled (Figs. 9d, 43; Provonsha & McCafferty 1995: fig. 7).

(11) Filtering setae on tibia and tarsus of fore leg (Fig. 40; Provonsha & McCafferty 1995: figs. 5, 16).

(12) Maxillary palp two-segmented (Fig. 12c). This character can also be observed as parallel developments in the Brachycercinae and some families of the Panota (see McCafferty & Wang 2000, Kluge 2004).

(7) and (11) are not unique in the *Amercaenis* group but can also be found in the *Clypeocaenis* group. That means in the two closely related lineages there is theoretically a possibility for another phylogenetical interpretation.

The genus *Clypeocaenis* shows two apomorphies which are further developments from (11) and (2) (partly):

(13) Filtering setae are arranged in rows (Fig. 40). A few setae also often present on inner margin of femur and in a basket-like arrangement on mandible (Provonsha & McCafferty 1995: figs. 13, 16).

(14) Clypeus strongly protruding and with long setae (Fig. 39).

The *Trichocaenis/Callistellina* group is not defined by apomorphies. Within this group *Callistellina* is separated by two apomorphic characters:

(15) Head with microscopic pits each with a hand-shaped microtrichium (Sun & McCafferty 2001: figs. 9, 10; Malzacher 2009b: fig. 10).

(16) Thoracic notae with ridges or bulges (Sun & McCafferty 2001: fig. 1). A single medial longitudinal ridge is also visible in *Kalimaenis*, Fig. 32.

5 Discussion

Caenis, species with tarsal projections

Males of all herein described species of *Caenis* are characterized by fore tarsi with apical projections on segments II–IV which have strong small spines (Figs. 1f, 4f). In the *Caenis cibaria* group from Africa the males possess tarsomeres that are apically slightly broadened and equipped with strong spines: only a few very short spines in *Caenis nigricola* (Malzacher 2011: fig. 6i) or a large number of longer spines, e. g. in *Caenis gilliesi* (Malzacher 1990: fig. 6a), a shaping that can also be observed in the Indian *Caenis picea*. Some other species from Asia (unde-

scribed) show transitional stages between these two forms: a species from Thailand with stronger apical broadenings, maybe identical with *Caenis nigropunctata* sensu Ulmer (1939), and two other species from this country and from India with short processes. Whereas in all these cases the tarsal segments are equipped with processes on both sides, in Borneo the development has moved to forms with two processes on the one hand and one apico-median process on segments II and III on the other hand (segment IV has two processes in all cases). The latter character state seems to be the apomorphic one.

Within this apomorphic species group the different genital structures of *Caenis fregatula* (Figs. 3a, b) and the epithemata of the *Caenis bidigitata* eggs are conspicuous. The latter represent the so-called coiled-rope-type namely the *C. perpusilla* subtype, that is realized in *Caenis kohli* from West Africa and *Caenis perpusilla* from India and Sri Lanka (Malzacher 2011: figs. 13, 34, 35). In contrary to these two species the epithemata of *Caenis bidigitata* show tiny end knobs. From each knob 1–4 threads are leading off (like otherwise in the *C. robusta* subtype only, compare discussion in Malzacher 2011).

In the diagnoses of the *Caenis* species, characters which are common in the genus are listed first, followed by those which distinguish especially the here described species; e. g. the character "forceps with a tuft of long spines", which is widely distributed in the genus, is mentioned in the first part of the diagnosis and then the character "forceps with very thin spines" in the second part. In about half of all described *Caenis* species the larval stages are unknown. For that reason alone it seems difficult to use larval characters for a distinction "from all other species". In addition most of the diagnostic characters are widely distributed within the genus – often with numerous intermediate stages between the extremes – without implying hints about a phylogenetic system. One can even say they give the impression of an indiscriminate distribution. So in a diagnosis all characters mentioned in the description should be listed. As a compensation, the most important characters of the herein described *Caenis* species are compiled in Tab. 1.

Kalimaenis

This genus has two characters in common with the Brachycercinae, the presence of a forceps muscle and fore legs clearly reduced in length. The former can be regarded as a plesiomorphy although its appearance in combination with other structures forming a functional unit (present in Brachycercinae, Madecocercinae and Tasmanocoenini) seems to me to be apomorphic. Shortened fore leg is a derived state but not synapomorphic. In *Kalimaenis* the fore legs reach 0.76 of the length of the hind legs. In the Brachycercinae this value varies between 0.79 and 0.55 (taken from the figures in Sun & McCafferty 2008). Peculiarly the longest fore legs can be found in *Oriobrachys*.

Clypeocaenis

Clypeocaenis soldani is characterized by a flat, very broad body and strong setation. Bristles have more or less long branches (Fig. 38, left) or are sausage-shaped (Fig. 38, right). As far as I know, such bristles cannot be found in other species of the genus (see, however, *Caenis abdita*). The clypeus protrusion has up to 30 strong bristles; in *Clypeocaenis multisetosa* from India only 10–15 bristles can be observed (Soldán 1978). About 4 bristles can be found in *Clypeocaenis oligosetosa* from Vietnam (Soldán 1983). The remaining species *C. bisetosa* from Iran and India (Soldán 1978), *C. afrosetosa* widely distributed in West Africa (Soldán 1983), *C. femorisetosa* from Sri Lanka (Soldán & Landa 1991), and *C. umgeni* from South Africa (Provonsha & McCafferty 1995) only have two bristles. It can be deduced from the distribution that an apomorphic multiplication of clypeal bristles took place in the Eastern Orientalis. On the other hand the character state of microtrichia on the ventral side of the operculate gill is plesiomorphic in the eastern species *Clypeocaenis oligosetosa* and *C. soldani*, in contrary to *C. afrosetosa* (compare figs. 4 and 10 in Malzacher 2009b). The state of this character in the other species is unknown.

Bristles with a large number of long and ultrathin branches can be found in *Clypeocaenis soldani*, *Caenis abdita* and in a specialized form in *Kalimaenis sibylliana*. This can only be interpreted as parallel development, but I do not have an explanation why all these forms occur in Borneo.

Tigrocercus

Some time ago Jan Peters (Tallahassee), sent me two males and a female from Thailand. The males are very similar to the one described herein and the female shows eggs with the characteristic chorion structure of the eggs of the West African *Tigrocercus contractus* (Malzacher & Staniczek 2006: figs. 14a–c,) the only so far known species of the genus. This also supports the affiliation of the oriental species to this genus. There are some differences between *Tigrocercus nastassjae* and the specimens from Thailand that justify the description of a species of its own (in preparation). The diagnostic characters of all three species are listed in Tab. 3.

Oriobrachys

The herein described larva shows some differences to the larva of *Oriobrachys mahakam*, e. g. in shape and setation of maxilla and labium (compare Figs. 12e, f with Sun & McCafferty 2008: figs. 277, 278). Therefore it canot be excluded, that this larva represents a new species. Be

Tab. 1. Most important differential diagnostic characters of *Caenis* spp.

	Character	*C. sebastiani* n. sp.	*C. fregatula* n. sp.	*C. bidigitata* n. sp.	*C. abdita* n. sp.
1	Surface structur	honeycomb, netmeshes, often with denticles	strongly granulated, abdominal netmeshes + denticles	smooth	coarsely granulated, abdominal netmeshes + denticles
2	Surface setation		branched microtrichia		long bristles + hairs
3	Genae	slightly bulging	slightly bulging	not bulging	not bulging
4	Ratio length segment II : III of labial palp	2.0	1.8	2.3	1.7
5	Mandibular bristles	laterally, long and bent	dorsally, a few very thin	dorsal field, long bent	dorsally, a few very thin
6	Sides of pronotum	straight, slightly diverging, denticulate	diverging, slightly convex, denticulate	straight to convex, diverging, smooth	straight, parallel, ± denticulate
7	Fore femur, transverse row of bristles	straight, ± 10 bristles	irregular, ± 5 bristles	regular, 8–10 bristles	regular, ± 5 bristles
8	Shape of bristles of transverse row	large, spatulate	spatulate	very long, broad, spatulate	narrow, blunt
9	Setation of mid and hind femur	spatulate bristles	long, spatulate-pointed bristles	large, spatulate, longer and broader bristles	long bristles and sensitive hairs
10	Claws, shape and denticulation	slender without denticles	moderately bent	slender without denticles	tips bent without denticles
11	Coxal processes	inconspicuous	inconspicuous	inconspicuous	inconspicuous
12	Abdomen, lateral processes	short	short	short	short
13	Abdomen, lateral setation	long, pointed, shorter on segments VII–IX	long, pointed, shorter on segments VII–IX	long, pointed, short on segments VIII–IX	long, pointed, also on segments VIII–IX
14	Tergum II, postero-median process	short, broadly triangular	long, cone-shaped	very short, triangular	very short, broad, triangular
15	Gill II, row of ventral microtrichia	ending middle of hind margin	ending middle of hind margin	ending middle of hind margin	ending closer to lateral margin
16	Shape of microtrichia	circular to square-shaped	circular to square-shaped	± elongate	circular to square-shaped
17	Gill II, dorsal bristles, number and structure	± 6, along medial ridge	± 6, along medial ridge, strong denticles	6–8, broad spatulate, marking medial ridge	± 6, long, strong and pointed
18	Gill II, marginal setation	bristles on hind margin long and hairlike, laterally shorter, ± blunt	bristles short and spatulate on postero-lateral margin, long and thin on hind margin, moderate on lateral margins	bristles on hind margin hairlike, basally broad, laterally moderate, blunt	bristles very long on hind margin, of very different length on lateral margins
19	Gill II Y-shaped ridges	posteriorly reduced	well-developed, ± keeled	strongly reduced	well-developed
20	Setation on hind margin of terga VII–X	as usual	tergum VIII with bristles and denticles	as usual, bristles like that on hind margin of operculate gill	denticles and 4 long bristles on segment IX, very long denticles on segment X
21	Sternite IX, shape of hind margin	cut or slightly indented	flatly rounded	broadly rounded, slightly indented	only slightly protruding medially, ± angled
22	Sternite IX, bristles on hind margin	short thin, ± bifurcate	a few very short bifurcate	bifurcate, frayed	long, simple-bent medially
23	Sternite IX, dorsal shagreen field	± 3 submarginal rows	1–2 short submarginal rows	4–5 irregular rows	lacking?
24	Additional peculiar characters	labial palp segments I + II with ± 15 strong bristles	–	gill II ventrally with broad frayed bristles	larva entirely covered with mud, hold by very fine threads

Tab. 2. Differential diagnostic characters of the subfamily Caeninae, particularly the tribe Clypeocaenini.

	Character	Apomorphic state	Plesiomorphic state
1	Gill III	at last 8 filaments with 3 or more branches	more than 15, up to 25 filaments
2	Outline of head, lateral view	with bulges, clypeus ± protruding	evenly bowed
3	Gill II, ventral row of microtrichia	reaching hind margin of gill	not reaching hind margin
4	Gill II	with regular row of complex, scale-shaped microtrichia	with bands or irregular rows of spines, clusters of spines, or simple scales
5	Gill III	nearly all filaments 1- or 2-branched, only 1–3 filaments with 3 or more branches	more than 15 filaments with 3 or more branches
6	Mesonotum	broadened, outline of body evenly curved	not broadened, outline ± irregular
7	Operculate gill	inner ridge keeled	not keeled
8	Legs	long and slender, femora narrowed, with parallel sides	all parts shorter, femora broad
9	Maxillary palp	elongated, segment 1 conical, segments 2 + 3 coiled	shorter and not coiled
10	Hindclaw	with groups of fused micro-denticles	homo- or heterodont, without groups of fused micro-denticles
11	Fore leg	with filtering setae	without filtering setae
12	Maxillary palp	two-segmented	three-segmented
13	Filtring setae on fore leg	forming regular rows	irregularly arranged
14	Clypeus	strongly protruding, with long setae	± protruding, without long setae
15	Head	with microscopic pits, each with branched microtrichium	without those structures
16	Thoracic notae	with ridges or bulges	evenly bowed

Tab. 3. Differential diagnostic characters of the *Tigrocercus* spp.

Character	*Tigrocercus contractus*	*Tigrocercus nastassjae* n. sp.	*Tigrocercus* sp. (Thailand)
Base of antennal flagellum	not dilated	?	strongly dilated
Fore tarsus	segments II–V subequal in length	segments III–V subequal in length, segment I clearly longer	segments III–V subequal in length, segment I clearly longer
Abdominal terga I and II	without fingerlike processes	each with a long fingerlike process	tergum II with a fingerlike process, tergum I without
Abdominal segments	IV–IX with lateral filaments	IV–VII with lateral filaments	IV–VII with lateral filaments
Penis laterally	without tongue-shaped processes	with three small tongue-shaped processes	with three conspicuous tongue-shaped processes, the median one with large basal sclerite
Lateral sclerites	anteriorly diverging, basally not sclerotized and keeled	parallel, moderately sclerotized, with weakly S-shaped keels	parallel, strongly sclerotized, with S-shaped keels
Forceps	in its basal half moderately broadened, inner margin smooth	in its basal fourth strongly broadened, inner margin irregularly denticulated	in its basal third moderately broadened, inner margin smooth

that as it may, if the assumption in the remarks to *Oriobrachys* (see above) is correct – last doubts can only be dispelled by rearing males from larvae – the male genitalia of this genus are highly apomorphic compared to those of all other Brachycercinae genera which are rather similar to each other. The elongated and medially narrowed styliger and the very long, thin and apically rounded forcipes are unique within the Brachycercinae (compare Figs. 10e, h and g; *Cercobrachys etowah* is – according to Sun & McCafferty 2008 – closer related to *Oriobrachys* than to *Brachycercus harrisella*). On the other hand the larva of *Oriobrachys* is very similar to those of the other genera of the tribes Latineosini, to which *Oriobrachys* is assigned, and Cercobrachini. Both tribes share a synapomorphic character, namely the lateral process of abdominal segment VI long tongue-shaped and strongly bent medially (Sun & McCafferty 2008). *Oriobrachys* however is the only genus that shows the apomorphy of an operculate gill with a long sublateral ridge (Sun & McCafferty 2008). Larval and imaginal apomorphies together indicate the possibility of an own tribe opposite to the adelphotaxon Latineosini + Cercobrachini.

In more than half of the species of Brachycercinae the males are unknown. So it is not surprising that in the two monographies of the subfamily (SOLDÁN 1986, SUN & MCCAFFERTY 2008) genital structures are hardly considered in view of phylogenetic relationships. Perhaps the knowledge of these unknown males would show the phylogenetic position of *Oriobrachys* with its striking genitalia in a different light.

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New species and records of *Stilicoderus* and *Stiliderus*, primarily from the southern East Palaearctic region (Coleoptera: Staphylinidae: Paederinae)

Volker Assing

Abstract

Ten species of *Stilicoderus* Sharp, 1889 and one of *Stiliderus* Motschulsky, 1858 are described and illustrated: *Stilicoderus wrasei* **n. sp.** (China: Yunnan), *S. schuelkei* **n. sp.** (China: Yunnan), *S. denticulatus* **n. sp.** (China: Yunnan), *S. angulatus* **n. sp.** (China: Yunnan), *S. tuberculosus* **n. sp.** (China: Yunnan), *S. barbulatus* **n. sp.** (China: Yunnan), *S. psittacus* **n. sp.** (China: Sichuan, Shaanxi, Hubei, Yunnan), *S. aquilinus* **n. sp.** (China: Sichuan), *S. caprarius* **n. sp.** (Indonesia: New Guinea), *S. acutissimus* **n. sp.** (Indonesia: New Guinea), and *Stiliderus ocreatus* **n. sp.** (Indonesia: Bali). Two synonymies are proposed: *Stilicoderus japonicus* Shibata, 1968 = *S. malaisei* (Scheerpeltz, 1965), **n. syn.**, = *S. scheerpeltzi* (Rougemont, 1986), **n. syn.** Additional records of sixteen *Stilicoderus* species and of seven *Stiliderus* species, primarily from the Palaearctic region, are reported, among them nine new country records from China (4 records), Laos (4), and India (1). A catalogue of the *Stilicoderus* and *Stiliderus* species recorded from the Palaearctic region, including Myanmar and Assam, is provided. Thirty-three species of *Stilicoderus* and seven of *Stiliderus* are now known from this region. The diversity of *Stilicoderus* is greatest in China (22 species, with 18 species recorded from Yunnan alone), followed by Myanmar (11), North India (10), Nepal (7), Taiwan (4), and Japan (2). *Stiliderus* is represented in North India by four species, in China by three (all of them in Yunnan), and in Nepal, Myanmar, and Japan by one species each. The distributions of 18 species are mapped.

Keywords: Coleoptera, Staphylinidae, Paederinae, Stilicina, *Stiliderus*, *Stilicoderus*, Palaearctic region, Oriental region, Australian region, Himalaya, China, new species, new synonymies, new records, catalogue, diversity, distribution.

Zusammenfassung

Zehn Arten der Gattung *Stilicoderus* Sharp, 1889 und eine der Gattung *Stiliderus* Motschulsky, 1858 werden beschrieben und abgebildet: *Stilicoderus wrasei* **n. sp.** (China: Yunnan), *S. schuelkei* **n. sp.** (China: Yunnan), *S. denticulatus* **n. sp.** (China: Yunnan), *S. angulatus* **n. sp.** (China: Yunnan), *S. tuberculosus* **n. sp.** (China: Yunnan), *S. barbulatus* **n. sp.** (China: Yunnan), *S. psittacus* **n. sp.** (China: Sichuan, Shaanxi, Hubei, Yunnan), *S. aquilinus* **n. sp.** (China: Sichuan), *S. caprarius* **n. sp.** (Indonesien: Neuguinea), *S. acutissimus* **n. sp.** (Indonesien: Neuguinea) und *Stiliderus ocreatus* **n. sp.** (Indonesien: Bali). *Stilicoderus malaisei* (Scheerpeltz, 1965), **n. syn.**, und *S. scheerpeltzi* (Rougemont, 1986), **n. syn.**, werden mit *S. japonicus* Shibata, 1968 synonymisiert. Weitere Nachweise von sechzehn *Stilicoderus*- und sieben *Stiliderus*-Arten werden insbesondere aus der Paläarktis gemeldet, darunter neue Erstnachweise aus China (4 Nachweise), Laos (4) und Indien (1). Ein Katalog der aus der Paläarktis (einschließlich Myanmar und Assam) nachgewiesenen *Stilicoderus*- und *Stiliderus*-Arten wird erstellt. 33 *Stilicoderus*- und sieben *Stiliderus*-Arten sind derzeit aus dieser Region bekannt. Die Diversität der Gattung *Stilicoderus* ist am höchsten in China (22 Arten, 18 davon allein aus Yunnan nachgewiesen), gefolgt von Myanmar (11), Nordindien (10), Nepal (7), Taiwan (4) und Japan (2). *Stiliderus* ist in Nordindien mit vier Arten, in China mit drei (alle in Yunnan) sowie in Nepal, Myanmar und Japan mit jeweils einer Art vertreten. Die derzeit bekannten Verbreitungsgebiete von 18 Arten werden anhand von Karten illustriert.

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1 Introduction

The status of the paederine genera *Stiliderus* Motschulsky, 1858 (type species: *Stiliderus cicatricosus* Motschulsky, 1858) and *Stilicoderus* Sharp, 1889 (type species: *Stilicoderus signatus* Sharp, 1889) has had a confusing taxonomic history and been subject to controversy and inconsistency. Repeatedly, *Stilicoderus* has been synonymised with *Stiliderus* and revalidated subsequently. For more details and discussions see Rougemont (1986a, 1996). Rougemont (1996) gives a synopsis of the species groups defined in earlier papers and attributes them to three generic entities, *Stilicoderus*, *Stiliderus* sensu lato, and *Stiliderus* sensu strictu. A thorough phylogenetic approach has not been attempted. Therefore, and for practical purposes, *Stiliderus* and *Stilicoderus* are tentatively regarded as distinct genera for the time being, *Stiliderus* including all the species with bilobed and *Stilicoderus* those with simple tarsomeres IV.

The species of *Stiliderus* and *Stilicoderus* have been treated in a series of papers by Rougemont published during the period from 1985 to 1996 (see reference section). According to the latest contribution (Rougemont 1996), *Stiliderus* (sensu lato and sensu strictu) included 42 species in four species groups distributed in the East Palaearctic and Oriental regions, and *Stilicoderus* comprised 69 species and two subspecies in ten species groups in the East Palaearctic, Oriental, and Australian regions. Since then, one additional species of *Stilicoderus* has been described from Taiwan (Shibata 2002) and two names, one of them valid and one a synonym, have been moved from *Rugilus* Leach, 1819 to *Stilicoderus* (Assing 2012).

While different species groups can mostly be distinguished based on external characters alone, the same does not apply to the identification of species within some species groups. The only reliable character is often the morphology of the aedeagus, in some cases also the shape of the male sternite VIII. At the same time, some species, particularly those with vast distributions, are subject to pronounced intraspecific variation. Nevertheless, the descriptions of a number of species have been based exclusively on females, a practice unfortunately continued even in more recent papers.

In the course of a revision of Palaearctic and Oriental *Rugilus*, numerous specimens of *Stiliderus* and *Stilicoderus* were seen that had erroneously been attributed to *Rugilus*. Additional material was found in paederine material from various collections, which was forwarded to me for identification and study. A particularly diverse and comprehensive contribution eventually came from Michael Schülke (Berlin), who had accumulated material primarily from China collected during a series of field trips to various Chinese regions since the 1990s. The material studied yielded not only a number of new records of zoogeographic interest, but also eleven new species which are described below.

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2 Material and methods

The material referred to in this study is deposited in the following public institutions and private collections:

cAss	author's private collection
cKle	private collection Andreas Kleeberg, Berlin
cSch	private collection Michael Schülke, Berlin
cSha	private collection Alexey Shavrin, Daugavpils
cSme	private collection Aleš Smetana, Ottawa
NHMW	Naturhistorisches Museum Wien (H. Schillhammer)
NME	Naturkundemuseum Erfurt (M. Hartmann)
SDEI	Senckenberg Deutsches Entomologisches Institut, Müncheberg (L. Behne)
SMNS	Staatliches Museum für Naturkunde, Stuttgart (W. Schawaller)
SNSD	Senckenberg Naturhistorische Sammlungen Dresden (O. Jäger)
ZMUC	Natural History Museum Denmark / University of Copenhagen Zoological Museum (A. Solodovnikov)

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). For the photographs a digital camera (Nikon Coolpix 995) was used. The maps were created using MapCreator 2.0 (primap) software.

Head length was measured from the anterior margin of the frons to the posterior margin of the head, head width across eyes,

Tab. 1. *Stilicoderus* and *Stiliderus* species recorded from the East Palaearctic, including Myanmar and Assam. New country and province records reported in the following chapter are given in bold print. In the references column, only original descriptions and records based on revisory work, on an examination of the male sexual characters, or that were considered reliable for other reasons are considered. – The articles are abbreviated as follows (those containing primary records are given in bold print): A12 = Assing (2012); App = Assing (present paper); B38 = Bernhauer (1938); Ca31= Cameron (1931); Co75 = Coiffait (1975); Co78 = Coiffait (1978); Co82a = Coiffait (1982a); Co82b = Coiffait (1982b); F95 = Fauvel (1895); I84 = Ito (1984); K59 = Kraatz (1859); M58 = Motschulsky (1858); R85a = Rougemont (1985a); R86a = Rougemont (1986a); R86b = Rougemont (1986b); R86d = Rougemont (1986d); R96 = Rougemont (1996); Sc65 = Scheerpeltz (1965); Sh68 = Shibata (1968); Sh74 = Shibata (1974); Sh02 = Shibata (2002); Sm04 = Smetana (2004); Sp89 = Sharp (1889); W94 = Watanabe (1994); WS72 = Watanabe & Shibata (1972). – * = record/description based exclusively on females.

Taxon	Revised distribution	References
Stilicoderus		
angulatus n. sp.	China: Yunnan	**App**
aquilinus n. sp.	China: Sichuan	**App**
barbulatus n. sp.	China: Yunnan	**App**
birmanus Scheerpeltz, 1965	Myanmar; China: Yunnan*	**R86a**, **R96**, **Sc65**, Sm04
continentalis Rougemont in litt.	China: Sichuan	**App**
denticulatus n. sp.	China: Yunnan	**App**
discalis Fauvel, 1895	Myanmar; Thailand; **Laos**; Vietnam	**App**, **F95**, **R86a**, R96
exiguitas Shibata, 1974	Taiwan	**App**, R86a, **R96**, **Sh74**, **Sh02**, Sm04
feae Fauvel, 1895	Nepal; N-India; Myanmar; China: Yunnan; Thailand; **Laos***	**App**, **Co82a**, **F95**, **R85a**, **R86a**, **R96**, Sm04
fenestratus Fauvel, 1895	Nepal; N-India; Myanmar; China: Yunnan; Thailand	**App**, **F95**, **R86a**, **R96**, Sm04
formosanus Rougemont, 1996	**China: Fujian**; Taiwan	**App**, **R96**, **Sh02**, Sm04
granulifrons (Rougemont, 1985)	Nepal; N-India; Myanmar; **China: Yunnan**; Thailand	**App**, **R85a**, **R86a**, **R96**, Sm04
helferi (Rougemont, 1985)	Myanmar; China: Yunnan; Thailand	**R85a**, **R86a**, **R96**, Sm04
incognitus (Rougemont, 1986)	Myanmar	**R86a**, R96
japonicus Shibata, 1968 = *malaisei* (Scheerpeltz, 1965); n. syn. = *scheerpeltzi* (Rougemont, 1986); n. syn.	Myanmar; China: **Henan**, Hubei, Sichuan, Shaanxi, **Yunnan**; Japan	**App**, **R85a**, **R86a**, R96, **Sc65**, **Sh68**, Sm04, **W94**
kambaitiensis (Scheerpeltz, 1965) = *assamensis* (Rougemont, 1985) = *dubius* (Rougemont, 1985)	N-India (incl. Assam); Nepal; Myanmar; **Laos**	**App**, **R86a**, **R86b**, R96, **Sc65**, Sm04
kasaharai Shibata, 2002	Taiwan	**Sh02**
kuani Shibata, 1974	Taiwan	**Sh74**, **Sh02**, R86a, R96, Sm04
lomholdti (Rougemont, 1986)	**China: Yunnan**; Thailand	**App**, **R86a**, R96
malaisei Scheerpeltz, 1965	N-India; Myanmar	**R85a**, **R86a**, R96, **Sc65**, Sm04
minor Cameron, 1931 = *radjah* Coiffait, 1978	N-India; Nepal; Bhutan; China: Gansu, Shaanxi, Yunnan*	**App**, **Ca31**, **Co78**, **R85a**, **R86a**, **R96**, Sm04
nagamontium (Rougemont, 1986)	N-India: Assam	**R86a**, R96,
nepalensis (Rougemont, 1986)	N-India; Nepal	**R86a**, R96, Sm04
psittacus n. sp.	China: Shaanxi, Sichuan, Hubei, Yunnan	**App**
schuelkei n. sp.	China: Yunnan	**App**
shan (Rougemont, 1986)	Myanmar; **China: Yunnan**; Thailand	**App**, **R86a**, R96
similis (Rougemont, 1986)	Myanmar; Thailand	**R86a**, R96
signatus Sharp, 1889 = *reitteri* (Bernhauer, 1938)	China: Hubei, Sichuan, Shaanxi; Japan	**A12**, **App**, **B38**, **R85a**, **R86a**, R96, **Sh68**, Sm04, **Sp89**, **W94**, **WS72**
strigosus (Rougemont, 1985)	N-India; China: Yunnan; Thailand; Sumatra	**R85a**, **R86a**, **R96**, Sm04
trapezeiceps (Rougemont, 1986)	China: Yunnan; Thailand; **Laos**	**App**, **R86a**, **R96**, Sm04
tuberculosus n. sp.	China: Yunnan	**App**
variolosus Coiffait, 1975	Nepal; N-India	**App**, **Co75**, **Co82a**, **R85a**, **R86a**, R96, Sm04
wrasei n. sp.	China: Yunnan	**App**
Stiliderus		
cicatricosus Motschulsky, 1858 = *sculptipennis* Kraatz, 1859	N-India (incl. Meghalaya); Myanmar; China: Yunnan; Sumatra	**Co82b**, **K59**, **M58**, **R86d**, **R96**, Sm04
duplicatus (Ito, 1984)	S-Japan	**I84**, Sm04
loebli Rougemont, 1985	N-India: Assam	**R85a**, R86d, R96
occidentalis Rougemont, 1986	N-India	**App**, **R86d**, R96, Sm04
smetanai Rougemont, 1986	Nepal; **N-India**	**App**, **R86b**, R86d, R96, Sm04
yikor Rougemont, 1996	China: Yunnan; Thailand	**R96**, Sm04
yunnanensis Rougemont, 1996*	China: Yunnan*	**R96**, Sm04

elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, total length from the anterior margin of the mandibles (in resting position) to the apex of the abdomen, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The side of the aedeagus with the sperm duct opening is referred to as the ventral, the opposite side as the dorsal aspect.

The individual labels of type specimens are separated by slashes; they are cited in the original spelling and format, except that slashes were replaced with commas and that capitalized geographic names of countries are given in standard format (i. e., "China" rather than "CHINA"). Moreover, the following adaptations were made according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics, dates with the months always in Roman numbers.

The biogeographic limits are in accordance with Smetana (2004), if not indicated otherwise. The chronological order of the species and (sub-)group affiliations is based on Rougemont (1996).

3 The species of *Stilicoderus* and *Stiliderus* in the Palaearctic region, including Myanmar and Assam

Myanmar and the Indian province Assam are explicitly included here because they reach into the eastern Himalaya, but are not included in the Palaearctic region sensu Smetana (2004). In all, thirty-three species of *Stilicoderus* and seven of *Stiliderus* are now known from this region (Tab. 1). *Stilicoderus umbratus* Fauvel, 1904, a species listed by Smetana (2004) for North India, is excluded from this list. The species was described from southern India (Nilgiri Hills) and primary records from the Himalayan region of India are unknown (Rougemont 1996).

The region with the greatest diversity of *Stilicoderus* is mainland China (22 species, 18 of which have been recorded from Yunnan alone), followed by Myanmar (11 species), North India (10 species), Nepal (7 species), Taiwan (4 species), and Japan (2 species). *Stiliderus* is represented in North India by four species, in China by three (all of them recorded only from Yunnan), and in Nepal, Myanmar, and Japan by one species each.

4 Species descriptions and additional records

4.1 *Stilicoderus*

feae group

Stilicoderus feae Fauvel, 1895

Material examined

India: 3 exs., Uttarakhand, 14 km E Uttarkashi, 30°45'N, 78°34'E, 1450 m, 10.–12.IV.2012, leg. Shavrin (cSha, cAss); 7 exs., Uttarakhand, 15 km SW New Tehri, 30°16'N, 78°22'E, 870 m, 18.–20.IV.2012, leg. Shavrin (cSha, cAss); 2 exs., Uttarakhand, 10 km NW New Tehri, 30°27'N, 78°32'E, 1200 m, 9.–10.IV.2012, leg. Shavrin (cSha, cAss).

Nepal: 1 ♀, N Kathmandu, Shivapuri Lekh, upper Bagmati river valley, 1800–1900 m, 24.V.2005, leg. Schmidt (NME); 1 ♀, Dailekh district, N Dailekh, 1600 m, 1.–2.VI.1998, leg. Schawaller (SMNS); 1 ♀, Kathmandu, Phulchoki, V.1993, leg. Schimmel (cAss); 1 ♀, south slope of Dhaulagiri Himal, N Banduk village, 28°28'N, 83°35'E, 1900–2300 m, 6.V.2009, leg. Schmidt (NME).

Laos: 1 ♀, Hu Phan province, Ban Saluei, Pu Phan mts., 20°15'N, 104°02'E, 1500–2000 m, 2.IV.–11.V.2001, leg. Hauck (cSch).

Comment

This species is widespread from the Himalaya across China to Thailand (Coiffait 1982a, Rougemont 1985a, 1986a, 1996, Smetana 2004). The above female from Laos represents a new country record.

Stilicoderus fenestratus Fauvel, 1895

Material examined

India: 22 exs., Uttarakhand, 14 km E Uttarkashi, 30°45'N, 78°34'E, 1450 m, 10.–12.IV.2012, leg. Shavrin (cSha, cAss).

Comment

The distribution of *S. fenestratus* is similar to that of *S. feae* and ranges from the Himalaya across Myanmar and Yunnan to Thailand (Rougemont 1996, Smetana 2004).

Stilicoderus shan (Rougemont, 1986) (Fig. 2)

Material examined

China: 1 ♂, 3 ♀♀, Yunnan, Lincang Pref., 33 km SSW Lincang, Bang-ma Shan, 23°36'N, 100°00'E, 2150 m, deciduous forest remnant, litter and dead wood sifted, 11.IX.2009, leg. Schülke (cSch, cAss).

Comment

The original description of *S. shan* is based on type material from Myanmar (type locality: "Burma, S. S. S. Kalaw, ca. 1300 m") and Thailand (Doi Inthanon and Doi Pui) (Rougemont 1986a). The above specimens represent the first record from China. The distribution is mapped in Fig. 2.

Stilicoderus baliensis (Rougemont, 1986)

Material examined

Indonesia: 2 ♂♂, 1 ♀, Bali, Kebun Raya, 1600 m, 4.II.1994, leg. Pedersen (ZMUC, cAss).

Comment

Stilicoderus baliensis, whose original description is based on a male holotype and a female paratype from

"Bali, Lake Buayan", was described as a subspecies of *S. drescheri* Cameron, 1936, probably because the aedeagus is of similar general morphology and the differences between *S. baliensis* and *S. drescheri* are not very pronounced. However, the same applies to many other species groups in *Stilicoderus*, too, and there is no zoogeographic evidence supporting the subspecific status of *S. baliensis*. Consequently, *S. baliensis* is here treated as a distinct species.

signatus group

Stilicoderus signatus Sharp, 1889
(Figs. 1, 3, 4)

Material examined

Japan: 2 exs., Hokkaido, 40 km S Sapporo, Shikotsu-ko lake, 24.IX.2007, leg. Lackner (cAss); 2 exs., same data, but 5.X.2008 (cAss); 1 ex., Hokkaido, Ebetsu-shi, Nopporo Shinrin Koen, 20.X.2007, leg. Lackner (cAss); 2 exs., Hokkaido, Sapporo env., Nopporo Virgin Forest, X.2008, leg. Lackner (cAss); 1 ex., Hokkaido, Ebetsu city, Nopporo Virgin Forest, sifted, 5.V.2006, leg. Lackner (cAss); 1 ex., Hokkaido, Sapporo-Maruyama, 23.V.2007, leg. Lackner (cAss); 1 ♂, 2 ♀♀, Honshu, Osaka, Mt. Kongo, 9.X.1993, leg. Ito (SDEI, cAss); 1 ♀, Osaka, Mt. Myoken, 25.VI.1993, leg. Ito (SDEI); 1 ♂, Honshu, Osaka, Mt. Kongo, 9.X.1993, leg. Ito (cAss); 1 ♀, Honshu, Shiga, Hourai mt., Kojorou valley, 4.V.1994, leg. Ito (SDEI).

China: 1 ♂, 3 ♀♀ [2 ♀♀ teneral], Shaanxi, Qinling Shan, 108 km SW Xi'an, autoroute km 93 S of Zhouzhi, 33°45'N, 107°56'E, 1650 m, mountain forest, sifted, 1.–2.IX.1995, leg. Pütz, Schülke, Wrase (cSch); 1 ♂, 2 ♀♀, Shaanxi, Qinling Shan, 105 km SW Xi'an, pass on road Foping–Zhouzhi, N-slope, 33°44'N, 107°59'E, 1990 m, small creek valley, mixed deciduous forest, 2. & 4.VII.2001, leg. Wrase (cSch, cAss); 1 ♂, Sichuan, Qingcheng Shan, NW Chengdu, 30°54'N, 103°33'E, 650–700 m, 18.V.1997, leg. Wrase (cAss); 1 ♀ [teneral], Sichuan, Wenjiang District, Dujiangyan Co., Qingcheng Shan, 56 km NW Chengdu, 30°54'N, 103°33'E, 975 m, forest remnant near stream, 18.VI.1999, leg. Schülke (cSch).

Comment

Stilicoderus signatus appears to be widespread in Japan and China, where it had previously been recorded from Hubei, Sichuan, and Shaanxi (Smetana 2004). Rougemont (1996) reported *S. signatus* from China, but had not given any primary records from there. The records in Smetana (2004) are apparently based on contributions by Schülke (unpubl.). The distribution in China is illustrated in Fig. 1. For additional records from Japan see Rougemont (1985a, 1986a), Shibata (1968), Watanabe (1994), and Watanabe & Shibata (1972).

Slight differences in the shape of the ventral process of the aedeagus are noticeable between the material from

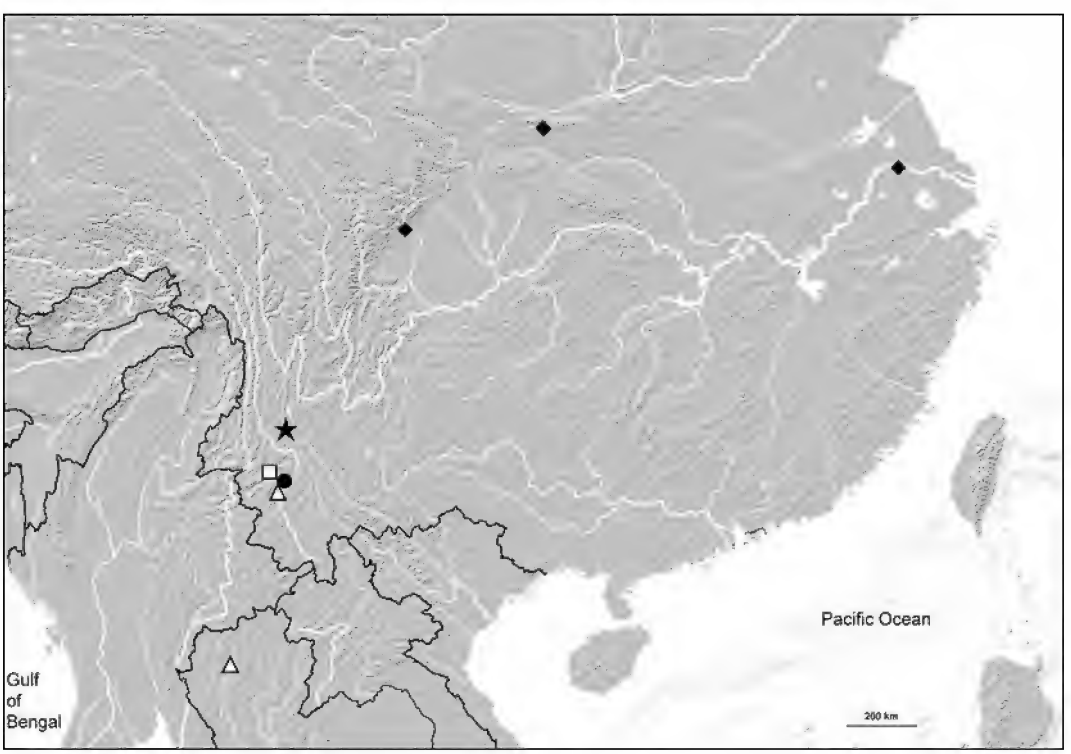


Fig. 1. Distribution of species of the *Stilicoderus signatus* group in China and adjacent regions: *S. signatus* (diamonds; records from Japan not shown); *S. schuelkei* (star); *S. denticulatus* and *S. angulatus* (square); *S. wrasei* (circle); *S. lomholdti* (triangles).

Japan and from China (Figs. 3, 4), but they appear to be an expression of intra- rather than interspecific variation.

The material from China was collected at altitudes of 650–1990 m. Teneral specimens were found in June and September.

Stilicoderus kambaitiensis (Scheerpeltz, 1965) (Figs. 2, 5, 6)

Material examined

Nepal: 8 exs., Manaslu range, S Bara Pokhari, 28°15'N, 84°25'E, 2100 m, 29.IV.2005, leg. Schmidt (NME, cAss); 5 ♂♂, 6 ♀♀, Dhaulagiri, Baglung Lekh, W Baglung, 28°50'N, 83°31'E, 2400 m, 12.V.2004, leg. Kleeberg (cKle, cAss); 2 ♂♂, 4 ♀♀, Baglung Lekh, ca. 15 km W Baglung, 2400 m, 11.V.2004, leg. Kleeberg (cKle); 1 ♂, 6 ♀♀, Baglung Lekh, 10 km W Baglung, 2500 m, 10.V.2004, leg. Kleeberg (cKle); 7 ♂♂, 9 ♀♀, Baglung Lekh, 10–15 km W Baglung, 2350–2550 m, leg. Kleeberg (cKle, cAss); 1 ♂, Baglung Lekh, upper Tara Khola, Karkha, 2600 m, 18.V.2004, leg. Kleeberg (cAss); 1 ♂, 1 ♀, Baglung Lekh, 30 km W Baglung, N Tara Khola, 18.V.2004, leg. Schmidt (cKle); 10 exs., south slope of Dhaulagiri Himal, N Banduk village, 28°28'N, 83°35'E, 1900–2300 m, 6.V.2009, leg. Schmidt (NME, cAss); 3 ♀♀, Shivalaya env., bank of Kimti Khola, 2.V.1993, leg. Kleeberg (cKle); 1 ♀, Annapurna, Madi Khola valley, below Sikles, 1500 m, 10.V.1996, leg. Schmidt & Jäger (SNSD).

Laos: 3 exs., Hu Phan province, Ban Saluei, Pu Phan mts., 20°15'N, 104°02'E, 1500–2000 m, 2.IV.–11.V.2001, leg. Hauck (cSch, cAss).

Comment

Stilicoderus kambaitiensis was originally described from Myanmar and subsequently recorded also from Nepal and northern India (Rougemont 1986a, 1986b, Smetana 2004). Strangely, Rougemont (1996) indicates the species only from "Burma". The currently known distribution is mapped in Fig. 2.

The above specimens from Laos are distinguished from the Himalayan material by larger body size, and a somewhat larger aedeagus with apical internal structures of slightly different shape (Fig. 5). The male sternite VIII of a male from Laos is illustrated in Fig. 6. Males from the region between Meghalaya, Burma, and Laos would be required to decide if the observed differences are an expression of intra- or of interspecific variation.

Stilicoderus wrasei **n. sp.** (Figs. 1, 7–10)

Type material

Holotype ♂: "China (Yunnan) Lincang Pref., Xue Shan, 11 km ENE Lincang, 2510 m, 23°55'01"N, 100°11'17.5"E (second. pine forest with *Rhodod.*, small cleft with water, litter sifted), 10.IX.2009 D. W. Wrase [39] / Holotypus ♂ *Stilicoderus wrasei* sp. n. det. V. Assing 2012" (cAss).

Paratype: 4 ♀♀ [3 teneral]: same data as holotype (cSch, cAss).

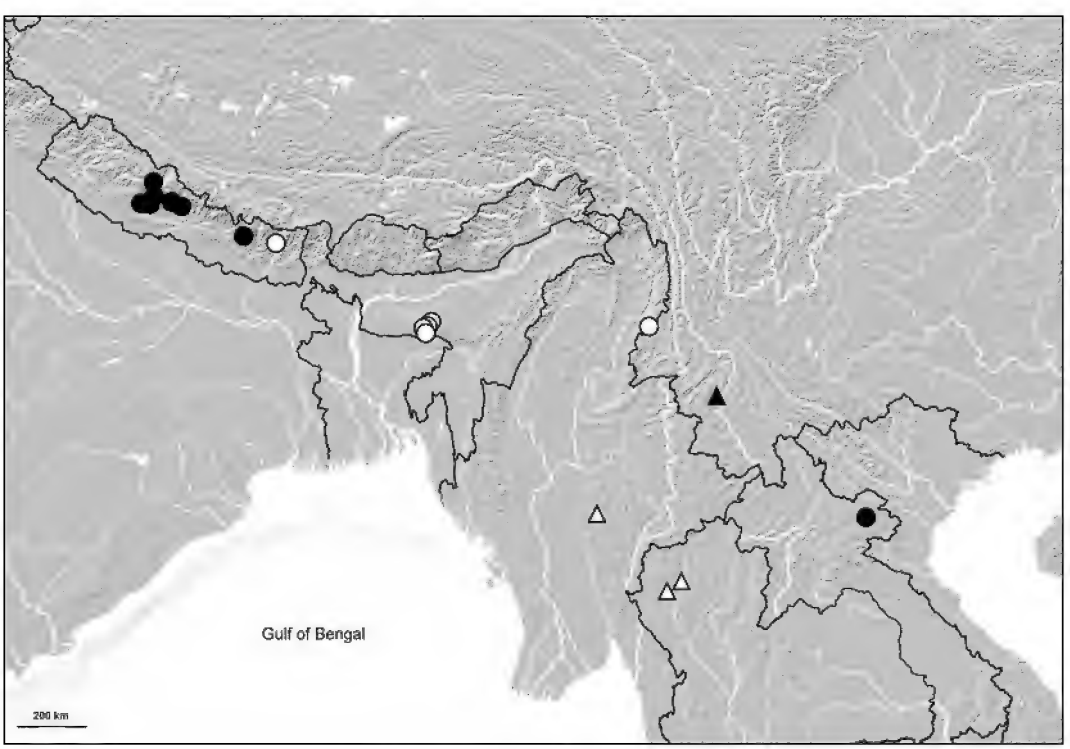


Fig. 2. Distribution of *Stilicoderus kambaitiensis* (circles) and *S. shan* (triangles). – Filled symbols: examined records; open symbols: literature records.

Etymology

The species is dedicated to my friend DAVID WRASE (Berlin), distinguished specialist of Carabidae, who collected the type material.

Description

Body length 6.0–6.5 mm; length of forebody 3.8–4.1 mm. Habitus as in Fig. 7. Coloration: body blackish, elytra with obliquely oval dark-yellowish spot in anterior half; legs yellowish, femoral apices narrowly blackish; antennae reddish with infuscate antennomere I.

Head approximately as long as broad, widest across eyes, smoothly tapering behind eyes, somewhat produced posteriorly; lateral margins smoothly curving towards posterior constriction, posterior angles completely obsolete; punctation dense, relatively fine, and defined, somewhat sparser in median dorsal portion; interstices without microsculpture. Eyes moderately large and distinctly projecting from lateral contours of head, approximately one-third as long as the distance from posterior margin of eye to posterior constriction.

Pronotum approximately 1.15 times as long as broad and 0.85 times as wide as head; punctation granulose, denser and coarser posteriorly than anteriorly; midline with broad, long, and glossy impunctate band; on either side of this band with longitudinal shallow impression, laterad of this impression with weak, sparsely punctate elevation.

Elytra approximately 0.9 times as long as, and distinctly broader than pronotum; punctation very coarse, not granulose, and predominantly arranged in more or less irregular series; interstices glossy, without microsculpture. Hind wings fully developed. Tarsi moderately slender; metatarsomere I nearly as long as the combined length of II and III; tarsomeres IV simple.

Abdomen narrower than elytra; punctation very fine and dense; interstices with distinct microreticulation, particularly on posterior tergites; posterior margin of tergite VII with palisade fringe.

♂: tergite VIII with broadly and distinctly concave posterior margin (Fig. 8); posterior margin of sternite VII weakly concave in the middle; sternite VIII weakly transverse, posterior excision almost V-shaped and rather deep, its depth approximately ⅖ the length of sternite (Fig. 9); aedeagus approximately 0.8 mm long, ventral process curved in lateral view, apical internal structures straight and long (Fig. 10).

Comparative notes

Based on external and the male sexual characters, *S. wrasei* belongs to the *S. signatus* species group, which previously comprised seven species (ROUGEMONT 1996); for a characterisation of this group see ROUGEMONT (1986a). *Stilicoderus wrasei* is reliably distinguished from other species of this group particularly by the morphology of the aedeagus. It is additionally separated from the widespread and externally highly similar *S. signatus* by the distinctly concave posterior margin of the male tergite VIII (*S. signatus*: weakly convex) and by the shape of the posterior excision of the male sternite VIII.

Distribution and natural history

The type locality is situated in the Xue Shan, Yunnan, China (Fig. 1). The type specimens were sifted from leaf litter in a secondary pine forest at an altitude of 2510 m. Three paratypes are teneral.

Stilicoderus schuelkei **n. sp.**
(Figs. 1, 11–14)

Type material

Holotype ♂: "China: Yunnan, Dali Bai Aut. Pref., Wuliang Shan, 20 km NW Weishan, 25°19'58"N, 100°07'59"E, 1900 m, creek valley, litter & old flood debris sifted, 17.IX.2009, leg. M. SCHÜLKE [CH09-58] / Holotypus ♂ *Stilicoderus schuelkei* sp. n. det. V. ASSING 2012" (cAss).

Etymology

The species is dedicated to my friend and colleague MICHAEL SCHÜLKE (Berlin), who collected the holotype and who made his outstanding material from China available to me for study.

Description

Body length 5.8 mm; length of forebody 3.4 mm. Aside from the slightly smaller body, externally highly similar to *S. wrasei*, but distinguished by the male sexual characters:

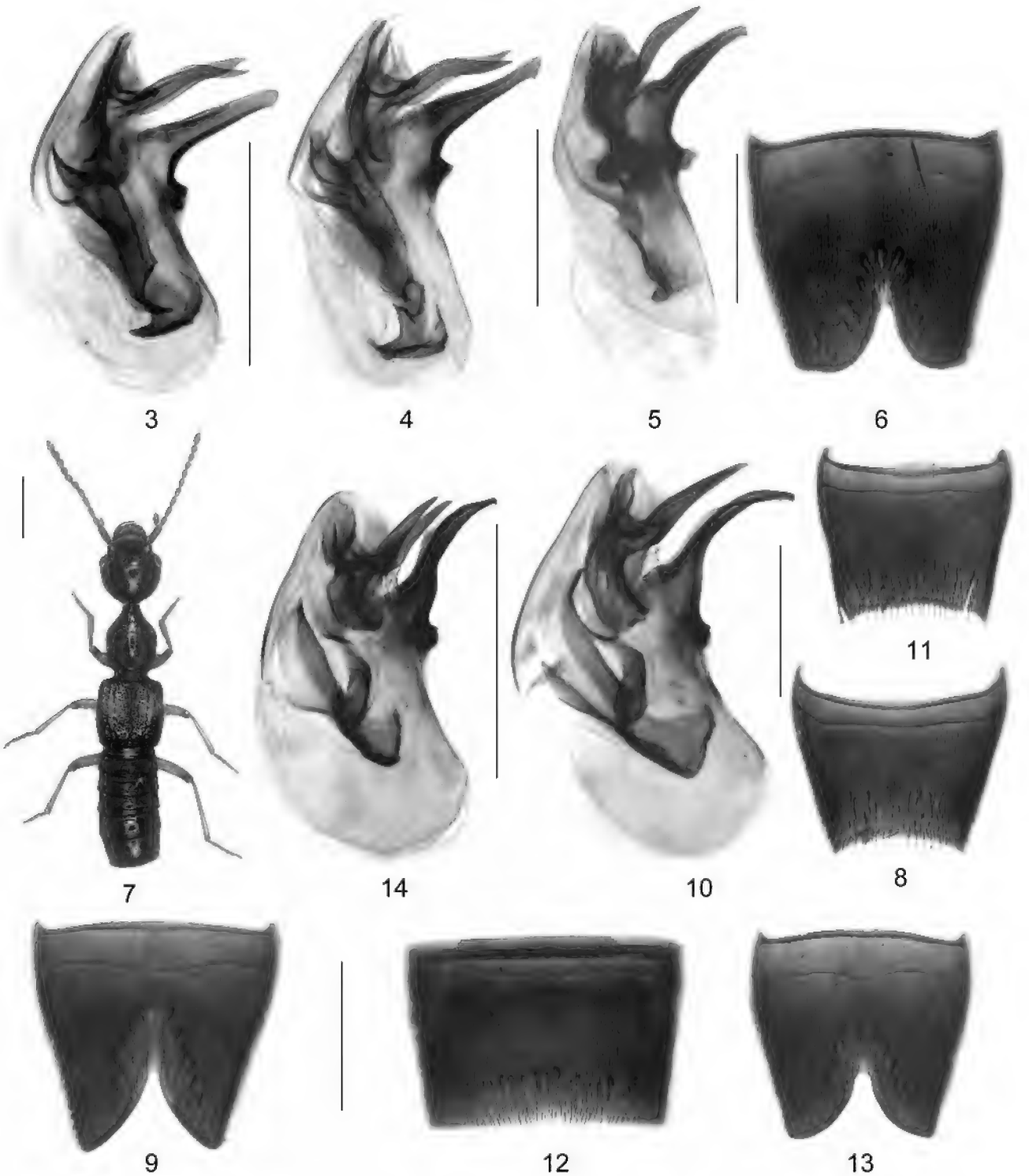
♂: tergite VIII similar to that of *S. wrasei* (Fig. 11); posterior margin of sternite VII weakly concave, otherwise not distinctly modified (Fig. 12); sternite VIII weakly transverse, posterior excision less deep and basally less acute than in *S. wrasei* (Fig. 13); aedeagus 0.75 mm long, ventral process stouter, slightly shorter, and less strongly curved in lateral view than in *S. wrasei*.

Comparative notes

Like the similar *S. wrasei*, *S. schuelkei* belongs to the *S. signatus* group. It is reliably distinguished from most representatives of this group only by the male sexual characters, from *S. wrasei* only by the shape of the posterior excision of the male sternite VIII and by the morphology of the aedeagus.

Distribution and natural history

The type locality is situated in the Wuliang Shan, Yunnan, China (Fig. 1). The holotype was sifted from leaf litter and old flood debris at an altitude of 1900 m.



Figs. 3–14. *Stilicoderus signatus* (3–4) from Japan (3) and Sichuan (4), *S. kambaitiensis* from Laos (5–6), *S. wrasei* (7–10), and *S. schuelkei* (11–14). – **3–5**, **10**, **14**. Aedeagus in lateral view. **6**, **9**, **13**. Male sternite VIII. **7**. Habitus. **8**, **11**. Male tergite VIII. **12**. Male sternite VII. – Scale bars: 1.0 mm (7), 0.5 mm (3–6, 8–14).

Stilicoderus denticulatus **n. sp.**
(Figs. 1, 15–20)

Type material

Holotype ♂: "China: Yunnan, Lincang Pref., Laobie Shan, Wei Bo Shan pass, 24°08'16"N, 99°42'53"E, 2375 m, creek valley, devastated second. decid. forest, litter & moss sifted, 8.IX.2009, leg. M. Schülke [CH09-35] / Holotypus ♂ *Stilicoderus denticulatus* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 3♂♂, 2♀♀ [1♂ slightly teneral]: same data as holotype (cSch, cAss).

Etymology

The specific epithet (Latin, adjective: with small tooth) refers to the subapically dentate ventral process of the aedeagus.

Description

Body length 5.8–6.7 mm; length of forebody 3.8–4.2 mm. Habitus as in Fig. 15. Externally highly similar to *S. wrasei* and *S. signatus*, but distinguished as follows:

Elytral spot on average somewhat smaller (Fig. 16). Punctation of head denser and coarser (Fig. 17); interstices distinctly narrower than diameter of punctures. Pronotum with denser punctation (Fig. 18), narrower impunctate median band, and less extensive lateral glossy patches.

♂: posterior margin of tergite VIII truncate, not concave; sternite VIII weakly transverse, posterior excision less deep and basally less acute than in *S. wrasei* (Fig. 19); aedeagus approximately 0.8 mm long, ventral process of very distinctive shape, subapically with small ventral tooth (Fig. 20).

Comparative notes

This species is reliably distinguished from most other representatives of the *S. signatus* group only by the conspicuous shape of the aedeagus and by the shape of the posterior excision of the male sternite VIII. It is additionally separated from *S. wrasei* and *S. schuelkei* by the posteriorly truncate male tergite VIII, and from *S. signatus* by slightly larger body size. The aedeagus of *S. denticulatus* most resembles that of *S. siamensis* (Rougemont, 1986) from Thailand, which, according to Rougemont (1986a) is similar in external characters (including coloration) to *S. kambaitiensis*. For illustrations of the aedeagus and the differently shaped male sternite VIII of *S. siamensis* see Rougemont (1986a).

Distribution and natural history

The type locality is situated in the Laobie Shan, Yunnan, China (Fig. 1). The specimens were sifted from leaf litter and moss in a degraded secondary deciduous forest at an altitude of nearly 2400 m, together with the holotype of *S. angulatus*. One of the specimens is slightly teneral.

Stilicoderus angulatus **n. sp.**
(Figs. 1, 21–27)

Type material

Holotype ♂: "China: Yunnan, Lincang Pref., Laobie Shan, Wei Bo Shan pass, 24°08'16"N, 99°42'53"E, 2375 m, creek valley, devastated second. decid. forest, litter & moss sifted, 8.IX.2009, leg. M. Schülke [CH09-35] / Holotypus ♂ *Stilicoderus angulatus* sp. n. det. V. Assing 2012" (cAss).

Etymology

The specific epithet (Latin, adjective) refers to the distinctly angled apical internal structures of the aedeagus.

Description

Body length 6.7 mm; length of forebody 4.1 mm. Habitus as in Fig. 21. Externally highly similar to *S. wrasei*, but distinguished as follows:

Elytral spot smaller, not reaching lateral margin in dorsal view (Fig. 22). General coloration darker; femora more extensively infuscate, apical ¼–⅓ blackish; tibiae extensively infuscate; tarsi blackish-brown; antennae dark-brown with blackish antennomere I. Head with slightly sparser punctation (Fig. 23). Pronotum with more defined, more regularly spaced, and slightly sparser punctation (Fig. 24), only with small and shallow impression posteriorly on either side of the glossy midline, and without glossy patches laterally. Elytra slightly larger.

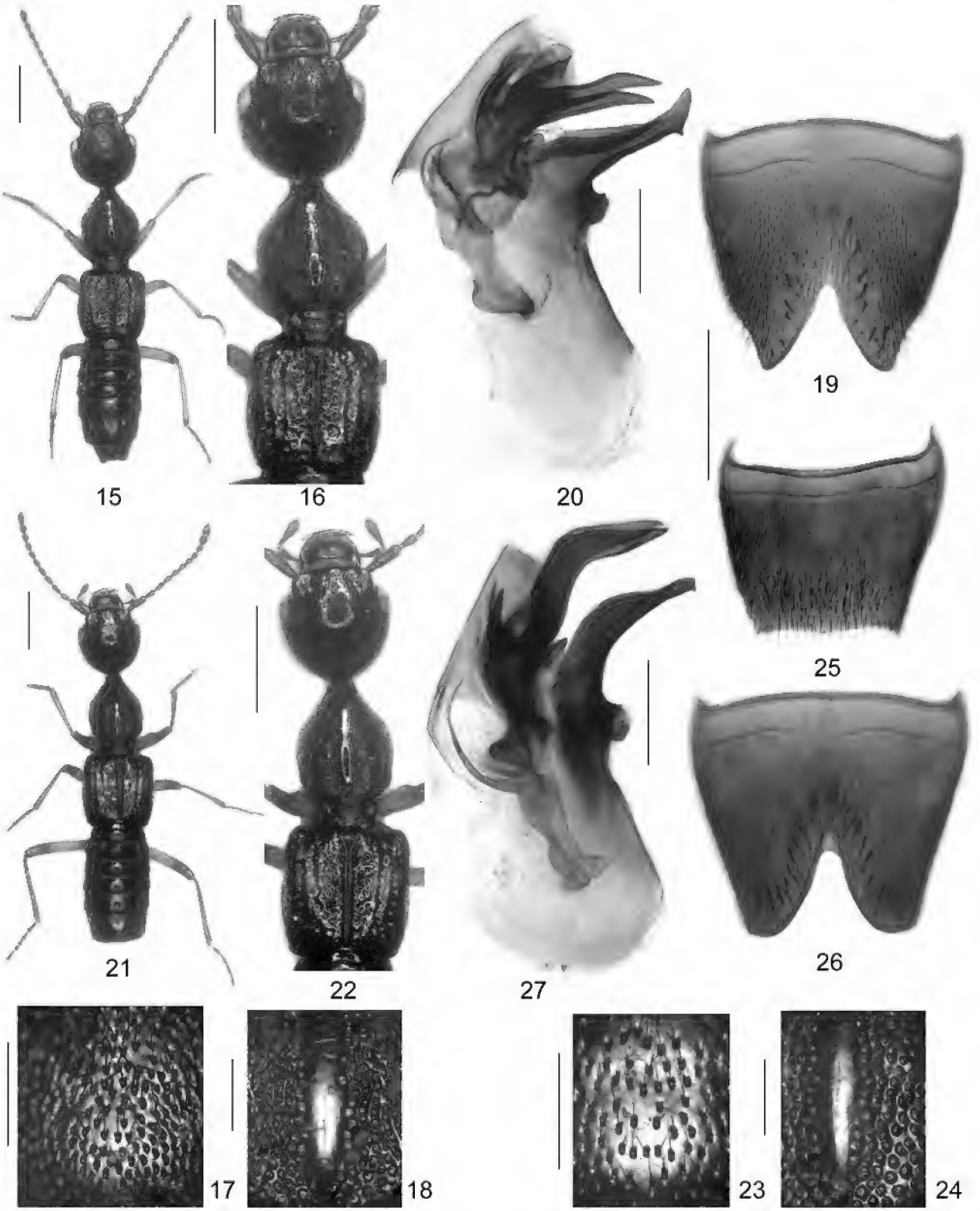
♂: posterior margin of tergite VIII weakly bisinuate, not distinctly concave (Fig. 25); sternite VIII weakly transverse, posterior excision less deep and basally less acute than in *S. wrasei* (Fig. 26); aedeagus 1.0 mm long, ventral process of very distinctive shape, apical internal structures distinctly angled in the middle (Fig. 27).

Comparative notes

Among the species of the *S. signatus* group, *S. angulatus* is characterised particularly by the morphology of the aedeagus and by the shape of the posterior excision of the male sternite VIII. It is additionally distinguished from the syntopic *S. denticulatus* by the darker coloration (especially of the legs), the finer and distinctly less dense punctation of the head, and by the more regular, somewhat less dense punctation and the less uneven surface of the pronotum. The aedeagus somewhat resembles that of *S. kambaitiensis*, but is distinguished by the more strongly curved ventral process; moreover, the posterior excision of the male sternite VIII is basally much less acute. For illustrations of *S. kambaitiensis* see Rougemont (1986a).

Distribution and natural history

The type locality is situated in the Laobie Shan, Yunnan (Fig. 1), and identical to that of *S. denticulatus*. The holotype was sifted from leaf litter and moss in a degraded secondary deciduous forest at an altitude of nearly 2400 m.



Figs. 15–27. *Stilicoderus denticulatus* (15–20) and *S. angulatus* (21–27). – **15**, **21**. Habitus. **16**, **22**. Forebody. **17**, **23**. Median dorsal portion of head. **18**, **24**. Posterior median portion of pronotum. **19**, **26**. Male sternite VIII. **20**, **27**. Aedeagus in lateral view. **25**. Male tergite VIII. – Scale bars: 1.0 mm (15–16, 21–22), 0.5 mm (19, 25–26), 0.2 mm (17–18, 20, 23–24, 27).

Stilicoderus lomholdti (Rougemont, 1986) (Fig. 1)

Material examined

China: 12♂♂, 13♀♀ [3 teneral], Yunnan, Lincang Pref., 33 km SSW Lincang, Bang-ma Shan, 23°36'N, 100°00'E, 2150 m, deciduous forest remnant, litter and dead wood sifted, 11.IX.2009, leg. Schülke (cSch, cAss).

Comment

The original description of *S. lomholdti* is based on a unique male from "Thailand, Chieng Mai Prov., Doi Suthep N. P., Doi Pui summit, 1650 m" (Rougemont 1986a). The above specimens represent the first record from China. The currently known distribution is mapped in Fig. 1.

discalis group

Stilicoderus discalis Fauvel, 1895

Material examined

Laos: 27 exs. [partly slightly teneral], Champasak province, Bolaven Plateau, Muang Paxong, Ban Hoyayteuy, Mt. Phu Din, 15°03'N, 106°17'E, 1100 m, disturbed primary rainforest, sifted from leaf litter, 13.–14.VI.2008, leg. Solodovnikov & Pedersen (ZMUC, cAss); 3 exs., Champasak province, Bolaven Plateau, Muang Paxong, Ban Thongvay, 15°14'N, 106°32'E, 1000–1200 m, disturbed primary rainforest, sifted from leaf litter, 7.–16.VI.2008, leg. Solodovnikov & Pedersen (ZMUC); 6 exs., Champasak province, Bolaven Plateau, Muang Paxong, Ban Thongvay, 15°14'N, 106°32'E, 1200 m, edge of disturbed primary rainforest, flight interception trap, 8.–16.VI.2008, leg. Solodovnikov & Pedersen (ZMUC, cAss); 1 ex., Vientiane province, Phou Khao Khouay, 18°20'N, 102°49'E, 700–800 m, strongly disturbed primary forest, near forest edge, flight interception trap, 26.–31.V.2008, leg. Solodovnikov & Pedersen (cAss).

Thailand: 1♂ [without aedeagus], Chaiyaphun, Phu Khieo-Bung Mon, 1000 m, pitfall trap, 25.I.1989, leg. Andersen & Read (ZMUC); 1♀, Chiang Mai, Doi Suthep, 1580 m, leaf litter, 13.XI.1995, leg. Wunderle (cAss).

Comment

This widespread species was previously known from Myanmar, Thailand, and Vietnam (Rougemont 1986a, 1996). The above specimens from Laos represent new country records.

variolosus group

Stilicoderus variolosus Coiffait, 1975 (Fig. 28)

Material examined

Nepal: 17 exs., Manaslu range, S Bara Pokhari Lekh, above Bhachok Goan village, 28°14'N, 84°25'E, 1600–1800 m, 29.IV.2005, leg. Schmidt (NME, cAss); 2 exs., Dolakha District, Gyalsung, 1800 m, 6.VI.2000, leg. Schawaller (SMNS, cAss);

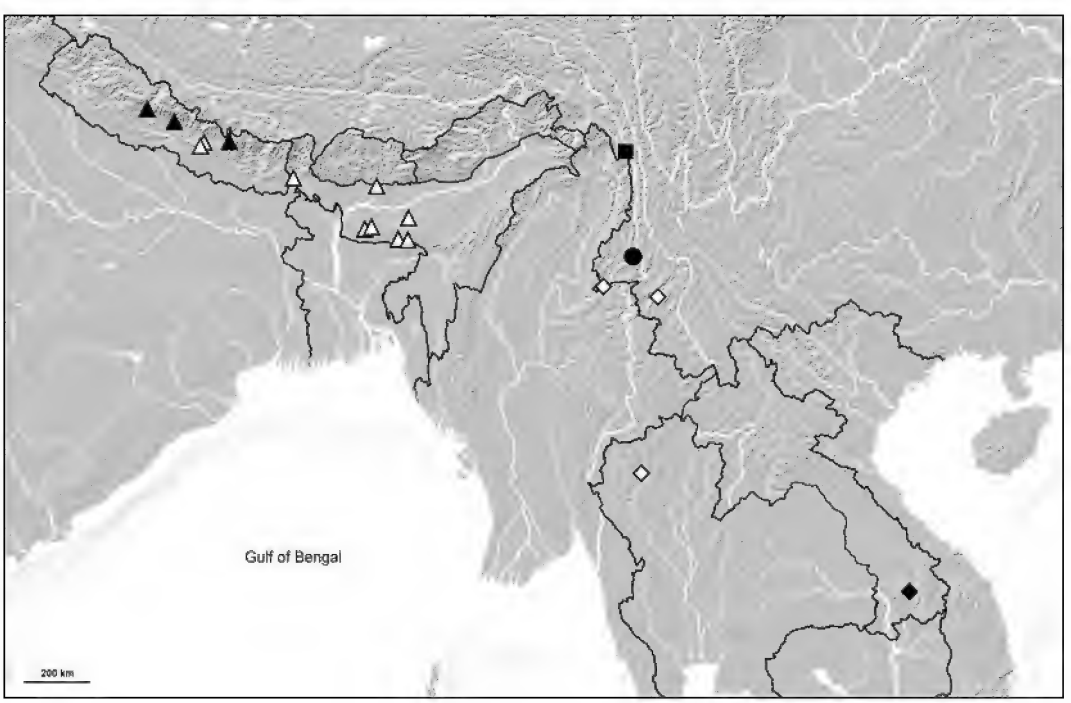


Fig. 28. Distribution of species of the *Stilicoderus variolosus* group: *S. variolosus* (triangles); *S. trapezeiceps* (diamonds); *S. barbulatus* (square); *S. tuberculosus* (circle). – Filled symbols: examined records; open symbols: literature records.

3♂♂, 2♀♀, southeastern Dhaulagiri Himal, Rahughat Khola valley, river bank S Dwari, 28°31'N, 83°31'E, 1850 m, 10.V.2002, leg. JÄGER (SNSD, cAss).

Comment

According to ROUGEMONT (1985a, 1986a, 1996), *S. variolosus* is widespread in the Himalaya. The currently known distribution is mapped in Fig. 28.

Stilicoderus trapezeiceps (Rougemont, 1986) (Fig. 28)

Material examined

Laos: 5 exs., Champasak province, Bolaven Plateau, Muang Paxong, Ban Thongvay, 15°14'N, 106°32'E, 1200 m, edge of disturbed primary rainforest, flight interception trap, 8.–16.VI.2008, leg. SOLODOVNIKOV & PEDERSEN (ZMUC, cAss); 3 exs. [1 slightly teneral], Champasak province, Bolaven Plateau, Muang Paxong, Ban Thongvay, 15°14'N, 106°32'E, 1000–1200 m, disturbed primary rainforest, flight interception trap, 7.–16.VI.2008, leg. SOLODOVNIKOV & PEDERSEN (ZMUC, cAss).

Comment

This species was previously known from Thailand and Yunnan (China) (ROUGEMONT 1996). The above specimens represent the first records from Laos. The currently known distribution is mapped in Fig. 28.

Stilicoderus tuberculosus **n. sp.** (Figs. 28–36)

Type material

Holotype ♂: "China: Yunnan [CH07-11], Baoshan Pref., Gaoligong Shan, nr. Xiaoheishan N. R., 35 km SE Tengchong, 2110 m, 24°50'16"N, 98°45'43"E, decid. forest litter, sifted, 30.V.2007, M. SCHÜLKE / Holotypus ♂ *Stilicoderus tuberculosus* sp. n. det. V. ASSING 2012" (cAss).

Paratypes: 1♂, 2♀♀: same data as holotype (cSch); 1♂, 2♀♀: "China: Yunnan, Baoshan Pref., Gaoligong Shan, W Pass 35 km SE Tengchong, 2100 m, 24°50'18"N, 98°45'43"E, devast. prim. dec. forest, litter, wood, mushrooms sifted, 25.VIII.2009, leg. M. SCHÜLKE [CH09-06]" (cSch, cAss); 2♀♀ [1 teneral]: same data as before, but "28.VIII.2009 … [CH09-06a]" (cSch, cAss).

Etymology

The specific epithet (Latin, adjective) alludes to the presence of a distinct tubercle on the male sternite VIII.

Description

Body length 5.7–7.0 mm; length of forebody 3.5–4.0 mm. Habitus as in Fig. 29. Coloration: body blackish; legs blackish-brown to blackish, with the tarsi and often also the tibiae slightly paler; antennae dark-brown, with antennomere I blackish.

Head 1.00–1.07 times as broad as long (Fig. 30), behind eyes broadly convex in dorsal view; punctation very dense, relatively fine, and defined; interstices noticeable, but narrower than diameter of punctures, without microsculpture (Fig. 31). Eyes large, approximately half as long as the distance from posterior margin of eye to posterior constriction. Anterior margin of labrum with five teeth; middle tooth pronounced and situated in median incision; internal lateral tooth pronounced; external lateral tooth minute and situated at some distance from internal lateral tooth.

Pronotum (Fig. 30) 1.05–1.10 times as long as broad and 0.90–0.95 times as wide as head; punctation granulose and very dense (Fig. 32); surface matt, except for the moderately shiny impunctate median band.

Elytra 0.90–0.95 times as long as, and distinctly broader than pronotum (Fig. 30); punctation composed of very dense granulose ground punctation and interspersed, somewhat irregularly spaced larger punctures (Fig. 33); surface matt. Hind wings fully developed. Tarsi short; metatarsomere I barely as long as the combined length of II and III; tarsomeres IV simple.

Abdomen as broad as, or slightly narrower than elytra; punctation very fine and very dense; interstices with distinct microreticulation; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII weakly convex.

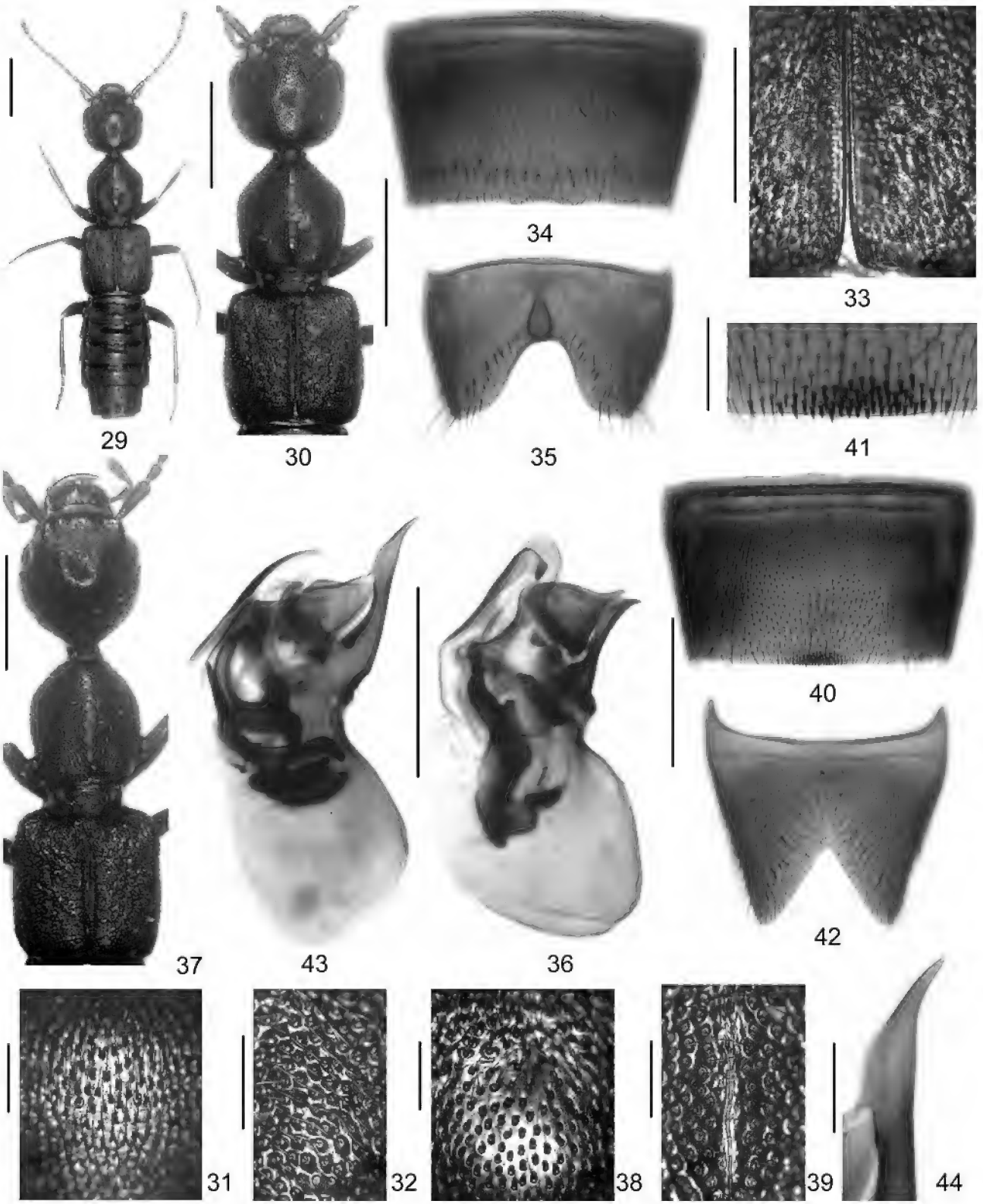
♂: posterior margin of sternite VII weakly and broadly produced in the middle (Fig. 34); sternite VIII anteriorly with distinct oblong tubercle and with pronounced, somewhat asymmetric, and almost U-shaped posterior excision, its depth more than half the length of sternite (Fig. 35); aedeagus approximately 0.9 mm long, with a pair of apical internal structures of distinctive shape, and with narrow ventral process in lateral view (Fig. 36).

Comparative notes

Based on the morphology of the aedeagus (shape of apical internal structures and of ventral process), *S. tuberculosus* belongs to the *S. variolosus* group, which previously comprised seven species. It is readily distinguished from other representatives of this group by the modifications of the male sternites VII and VIII, as well as by the morphology of the aedeagus. It is additionally separated from the widespread *S. variolosus* by its larger size, much larger, longer, and completely matt elytra, as well as by the completely different elytral punctation.

Distribution and natural history

The species was discovered in two adjoining localities in the Gaoligong Shan, Yunnan, China (Fig. 28). The specimens were sifted from leaf litter of deciduous trees at an altitude of approximately 2100 m. One specimen collected in August is teneral.



Figs. 29–44. *Stilicoderus tuberculosus* (29–36) and *S. barbulatus* (37–44). – **29**. Habitus. **30**, **37**. Forebody. **31**, **38**. Median dorsal portion of head. **32**. Postero-lateral portion of pronotum. **33**. Posterior median portion of elytra. **34**, **40**. Male sternite VII. **35**, **42**. Male sternite VIII. **36**, **43**. Aedeagus in lateral view. **39**. Posterior median portion of pronotum. **41**. Posterior median portion of male sternite VII. **44**. Apex of ventral process of aedeagus in lateral view. – Scale bars: 1.0 mm (29–30, 37), 0.5 mm (33–36, 40, 42–43), 0.1 mm (31–32, 38–39, 41, 44).

Stilicoderus barbulatus **n. sp.**
(Figs. 28, 37–44)

Type material

Holotype ♂: "China: N-Yunnan [C2005-12], Nujiang Lisu Aut. Pref., Gongshan Co., Gaoligong Shan, 2500 m, 27°45.404'N, 98°35.749'E, litter & debries [sic] at snowfield sifted during rain, 19.VI.2005, M. Schülke / Holotypus ♂ *Stilicoderus barbulatus* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 1♂, 4♀♀: same data as holotype (cSch, cAss).

Etymology

The specific epithet is an adjective derived from the Latin noun barbula, diminutive of barba (beard), and alludes to the cluster of modified setae on the male sternite VII.

Description

Body length 5.9–7.5 mm; length of forebody 3.8–4.2 mm. Coloration: body blackish; legs brown to dark-brown, usually with blackish-brown to blackish femora; antennae brown with infuscate antennomere I.

Head (Fig. 37) oblong, 1.10–1.15 times as broad as long, somewhat produced posteriorly; lateral margins smoothly curving towards posterior constriction, posterior angles completely obsolete; punctation dense, relatively fine, and defined (Fig. 38), similar to that of *S. tuberculosus*; interstices noticeable, but narrower than diameter of punctures, without microsculpture. Eyes moderately large and weakly projecting from lateral contours of head, approximately one-third as long as the distance from posterior margin of eye to posterior constriction. Anterior margin of labrum with four distinct teeth; middle tooth almost completely reduced; internal lateral tooth long; external lateral tooth minute and situated at some distance from internal lateral tooth.

Pronotum (Fig. 37) approximately 1.1 times as long as broad and 0.90–0.95 times as wide as head; punctation granulose and very dense (Fig. 39); surface (almost) matt; impunctate median band of reduced length, usually present only in posterior half.

Elytra (Fig. 37) approximately 0.95 times as long as, and distinctly broader than pronotum; punctation composed of very dense granulose ground punctation and interspersed, somewhat irregularly spaced larger punctures; interstices very narrow, but noticeable and glossy. Hind wings fully developed. Tarsi moderately slender; metatarsomere I approximately as long as the combined length of II and III; tarsomeres IV simple.

Abdomen approximately as broad as elytra; punctation very fine and dense; interstices with distinct microreticulation; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII weakly convex.

♂: sternite VII with almost straight posterior margin (Fig. 40), near middle of posterior margin with cluster of short modified setae (Fig. 41); sternite VIII with broad and deep, distinctly V-shaped posterior excision, its depth nearly half the length of sternite (Fig. 42); aedeagus approximately 1.15 mm long, with a pair of apical internal structures of distinctive shape, and with rather long ventral process (Fig. 43); apex of ventral process acute and dorsally with tooth-like process (Fig. 44).

Comparative notes

Like the preceding species, *S. barbulatus* belongs to the *S. variolosus* group. It is characterised particularly by the modifications of the male sternites VII and VIII, as well as by the morphology of the aedeagus. It is additionally distinguished from the externally similar and geographically close *S. tuberculosus* by the completely different shape of the head (posteriorly distinctly produced), the smaller and less protuberant eyes, the more coarsely granulose punctation of the pronotum, the more coarsely and less densely granulose punctation of the elytra, the more shiny surface of the elytra, and the longer and more slender tarsi. From the widespread *S. variolosus*, it additionally differs by larger body size, the posteriorly more strongly produced head, less convex eyes, the coarser punctation of the pronotum, larger and broader elytra, and by the completely different elytral punctation.

Distribution and natural history

The type locality is situated in the Gaoligong Shan, Yunnan, China (Fig. 28). The specimens were sifted from leaf litter and debris near a snowfield at an altitude of 2500 m.

minor group

Stilicoderus minor Cameron, 1931
(Fig. 45)

Material examined

Nepal: 4 exs., south slope of Dhaulagiri Himal, N Banduk village, 28°28'N, 83°35'E, 1900–2300 m, 6.V.2009, leg. Schmidt (NME, cAss).

Comment

This species was previously known from northern India (Darjeeling), Bhutan, China (Yunnan, Gansu, Shaanxi), and eastern Nepal (Cameron 1931, Coiffait 1978, Rougemont 1985a, 1986a, 1996). The above specimens represent the westernmost record. The currently known distribution is mapped in Fig. 45.

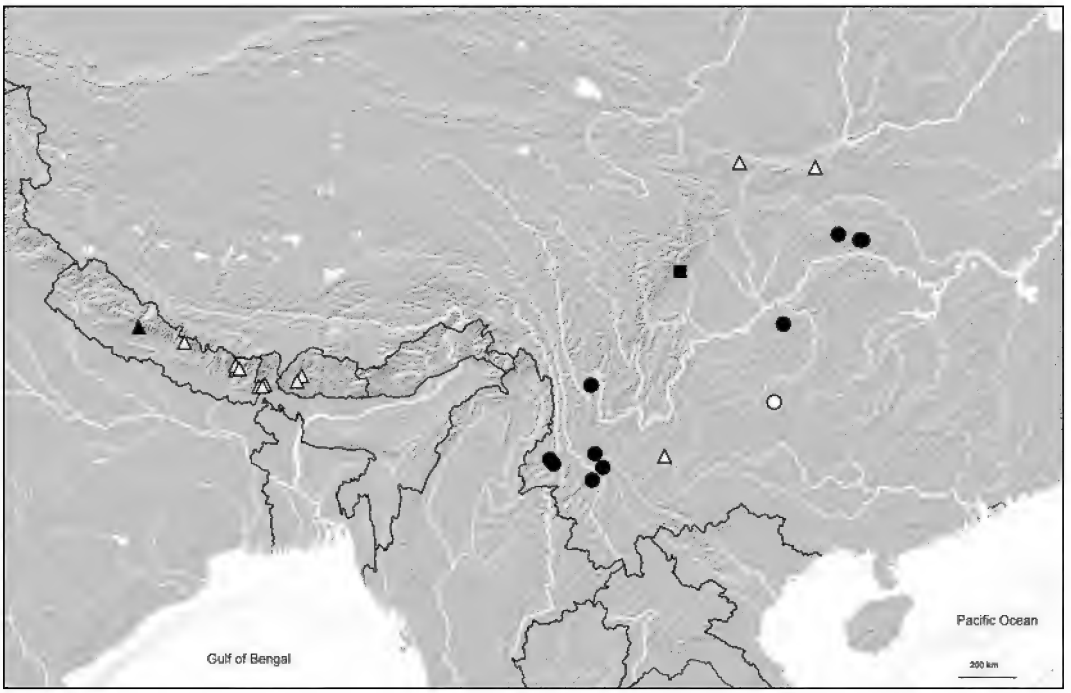


Fig. 45. Distribution of species of the *Stilicoderus minor* group: *S. minor* (filled triangle: examined record; open triangles: literature records); *S. aquilinus* (square); *S. psittacus* (filled circles). Open circle: doubtful literature record of *S. exiguitas* (probably referring to *S. psittacus*).

Stilicoderus exiguitas Shibata, 1974
(Figs. 46, 47)

Stilicoderus exiguitas Shibata, 1974: 12 ff.

Material examined

Taiwan: 1 ♂, Chiai Hsien, Fenchihu, 6.VIII.1976, leg. Shibata (cAss).

Comment

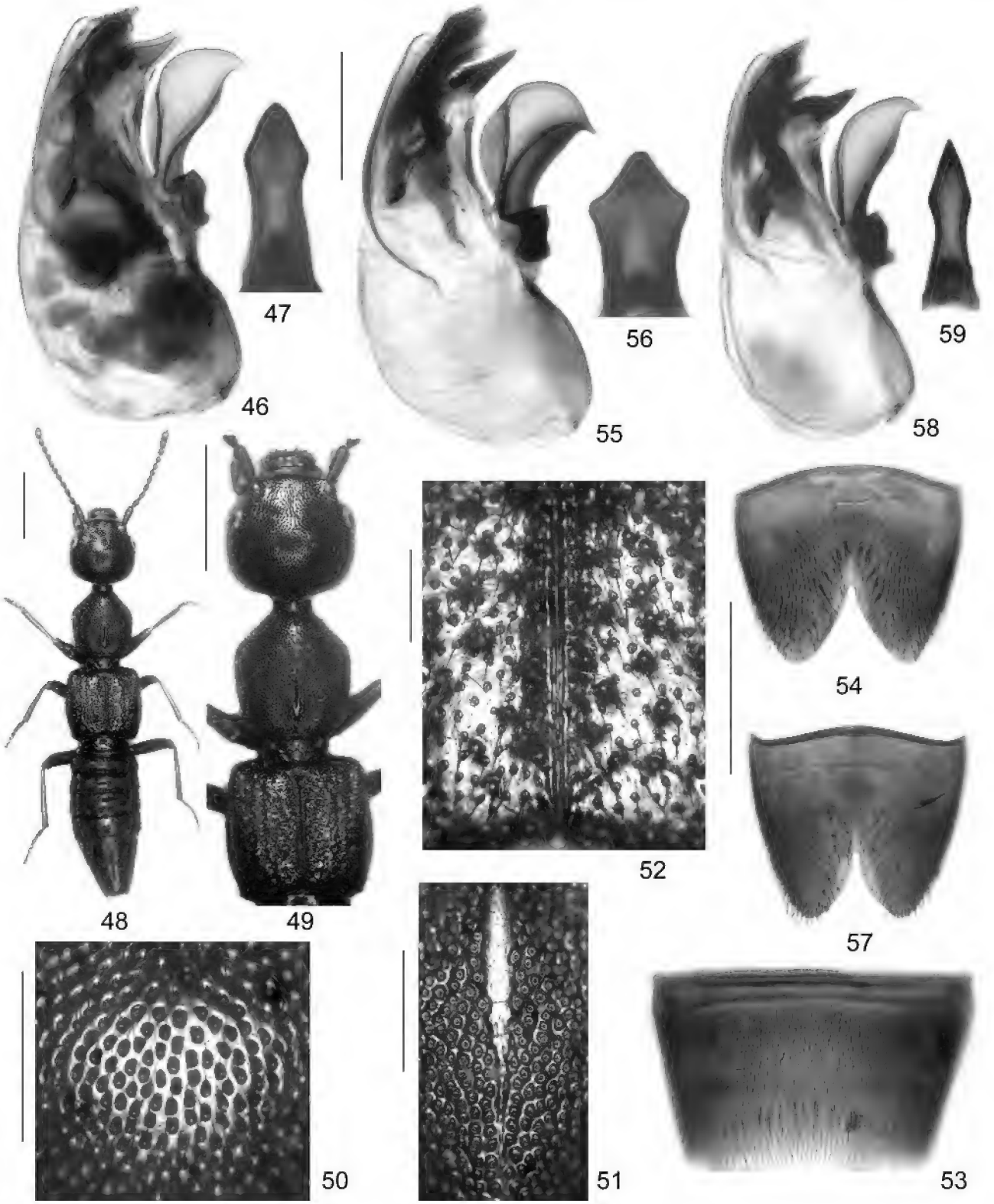
This species is probably endemic to Taiwan; for records see Shibata (1974, 2002). Previous records from Guizhou, mainland China (Rougemont 1986a, 1996), are likely to refer to *S. psittacus* (Fig. 45) and require confirmation. The aedeagus of the above male from Taiwan is illustrated in Figs. 46, 47.

Stilicoderus psittacus **n. sp.**
(Figs. 45, 48–56)

Type material

Holotype ♂: "China: Border Shaanxi – Sichuan (Daba Shan), pass 20 km SSE Zhenping, 1700–1800 m, 31°44'N, 109°35'E, 9.VII.2001, leg. M. Schülke [C01-07] / young dry mixed forest, field edge, small creek valley, moss (sifted) [C01-07] / Holotypus ♂ *Stilicoderus psittacus* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 1 ♂, 4 ♀♀: same data as holotype (cSch); 1 ♂, 1 ♀: "China: SE Sichuan, Jinfo Shan, 29°01N, 107°14E, 1750 m, 27.VI.1998, A. Smetana [C71] / 1998 China Expedition, J. Farkač, D. Král, J. Schneider & A. Smetana" (cSme, cAss); 1 ♀: "China: W-Hubei (Daba Shan), creek valley 8 km NW Muyuping, 31°29'N, 110°22'E, 1550–1650 m, 18.VII.2001, leg. M. Schülke [C01-16A]" (cSch); 1 ♂: "China: W-Hubei Daba Shan, mtn. range NE Muyuping, crk. valley / 4 km N Muyuping, 1700 m, 21.VII.01, A. Smetana [C116]" (cSme); 1 ♂, 3 ♀♀ [1 ♀ teneral]: "China: Yunnan, Lincang Pref., Xue Shan, 48 km N Lincang, 2070 m, 24°19'03"N, 100°07'13"E, forest remnant, N-slope, litter & mushrooms sifted, 12.IX.2009, leg. M. Schülke [CH09-45]" (cSch, cAss); 1 ♀: "China (Yunnan) Lincang Pref., Wuliang Shan, old pass road, W-side, 2200 m (small creek valley with primary forest remnant, litter/debris sifted), 24°42'58.6"N, 100°29'52.0"E, 12.IX.2009 D. W. Wrase [47]" (cSch); 1 ♀, same data, but "16.IX.2009, leg. M. Schülke [CH09-47a]" (cSch); 1 ♂, 1 ♀: "China: Yunnan [CH07-16A], Baoshan Pref., mountain range 14 km E Tengchong, 1850 m, 25°00'28"E, 98°38'07"E, field edge, compost and debris sifted, 1.VI.2007, M. Schülke" (cSch, cAss); 1 ♀: "China: Yunnan, Baoshan Pref., Gaoligong Shan, 33 km SE Tengchong, 2150 m, 24°51'22"N, 98°45'36"E, devast. primery [sic] deciduous forest, litter, wood, mushrooms sifted, 26.VIII.2009, leg. M. Schülke [CH09-08]" (cSch); 1 ♂: "China (Yunnan), Dali Bai Auton. Pref., Wuliang Shan, 9 km SW Weishan, 2450–2500 m, 25°10'14"N, 100°14'22"E (W. slope, sec. oak/pine for., pasture, und. stones), 13.VI.2007 D. W. Wrase [35]" (cSch); 1 ♂, 6 ♀♀: "China: Yunnan province, 1 km W of Haba, 19.VI.2007, Haba Xueshan Mts., 27°22.3'N, 100°07.7'E, 2750 m, J. Hájek & J. Růžička leg. [CH36] / sifted wet detritus



Figs. 46–59. *Stilicoderus exiguitas* (46–47), *S. psittacus* (48–56), and *S. aquilinus* (57–59). **46**, **55**, **58**. Aedeagus in lateral view. **47**, **56**, **59**. Ventral process of aedeagus in ventral view. **48**. Habitus. **49**. Forebody. **50**. Median dorsal portion of head. **51**. Median portion of pronotum. **52**. Posterior median portion of elytra. **53**. Male sternite VII. **54**, **57**. Male sternite VIII. – Scale bars: 1.0 mm (48–49), 0.5 mm (53–54, 57), 0.2 mm (46–47, 50–52, 55–56, 58–59).

and leaves under rocks, margin of mixed forest (with dominant *Pinus*, *Aesculus*) near small stream, close to village" (cSch).

Etymology

The specific epithet is a noun (Latin: parrot) in apposition and refers to the shape of the ventral process of the aedeagus, which somewhat resembles the beak of a parrot.

Description

Body length 5.5–6.2 mm; length of forebody 3.1–3.7 mm. Habitus as in Fig. 48. Coloration: head, pronotum, and abdomen blackish; elytra blackish with an extensive, oblique, reddish humeral spot, this spot usually extending mediad just short of the suture, more rarely smaller; legs brown with blackish-brown femora; antennae brown with infuscate antennomere I.

Head (Fig. 49) weakly transverse, approximately 1.05 times as broad as long, behind eyes smoothly convex in dorsal view; punctation moderately coarse, dense, and defined; interstices without microsculpture, distinctly narrower than punctures (Fig. 50). Eyes moderately large, slightly less than half as long as the distance from posterior margin of eye to posterior constriction.

Pronotum (Fig. 49) 1.05–1.10 times as long as broad and approximately 0.9 times as wide as head; punctation dense, rather coarse, and distinctly granulose (Fig. 51); midline with impunctate glossy median band reaching neither anterior nor posterior margins.

Elytra 0.80–0.85 times as long as, and distinctly broader than pronotum; punctation composed of coarse punctures with interspersed, somewhat granulose micropunctures (Fig. 52); interstices without microsculpture. Hind wings fully developed. Metatarsomere I approximately as long as the combined length of II and III.

Abdomen narrower than elytra; punctation very fine and very dense; interstices with distinct microreticulation; posterior margin of tergite VII with palisade fringe.

♂: sternite VII not distinctly modified (Fig. 53); sternite VIII with deep and apically narrow posterior excision (Fig. 54); aedeagus approximately 0.6 mm long, compact, and with ventral process of characteristic shape (Figs. 55, 56).

Comparative notes

Based on the similarly derived general shape of the ventral process of the aedeagus, *S. psittacus* is a close relative of *S. minor* Cameron, 1931 (West Bengal, Bhutan) and *S. exiguitas* Shibata, 1974 (Taiwan). It is reliably distinguished from both of them by the morphology of the aedeagus. That of *S. minor* is smaller and has a shorter and apically more angulate ventral process; that of the externally extremely similar *S. exiguitas* has a more slender (particularly in ventral view) and less strongly curved ventral process (lateral view). For illustrations of the aedeagi of *S. minor* and *S. exiguitas* see Rougemont (1986), Shibata (1974), and Figs. 46, 47. In addition, *S. exiguitas* has less strongly infuscate femora.

Distribution and natural history

This species is evidently widespread in China, where it was found in numerous localities in Sichuan, Shaanxi, Hubei, and Yunnan provinces (Fig. 45). It seems likely that previous records of *S. exiguitas* from Guizhou (Rougemont 1996) refer to this species. The examined specimens were collected by sifting leaf litter and debris in various forest biotopes and in a field margin at altitudes of 1550–2750 m. One specimen found in September is teneral.

Stilicoderus aquilinus **n. sp.**
(Figs. 45, 57–59)

Type material

Holotype ♂: "China: Sichuan (17), Qingcheng-Shan, NW Chengdu, 650–700 m, 30.53.57N, 103.32.23E, 3.–4.VI.1997, M. Schülke / *Stilicoderus exiguitas* Shib. det. 1997 G. de Rougemont / *Stilicoderus exiguitas* det. M. Schülke 1997 / Holotypus ♂ *Stilicoderus aquilinus* sp. n. det. V. Assing 2012" (cAss).

Paratype ♀: same data as holotype (cSch).

Etymology

The specific epithet (Latin, adjective: of an eagle) alludes to the resemblance of the ventral process of the aedeagus to the beak of an eagle.

Description

Body length 5.4–6.2 mm; length of forebody 3.3–3.4 mm. External characters, except for the somewhat coarser punctation of the head, as in *S. psittacus* and *S. exiguitas*.

♂: sternite VIII of similar shape as in *S. psittacus* and *S. exiguitas* (Fig. 57); aedeagus approximately 0.55 mm long, shaped as in Figs. 58, 59.

Comparative notes

The similar external and male sexual characters suggest that *S. aquilinus* is very closely related to *S. exiguitas* and *S. psittacus*. It is distinguished from both species by the somewhat coarser punctation of the head (some overlap with *S. psittacus*) and by the morphology of the aedeagus, particularly the shape of the ventral process and the more strongly sclerotised apical internal structures. In *S. exiguitas*, the ventral process is stouter, apically convex (not distinctly oblique) in lateral view, and apically shorter and broader in ventral view. In *S. psittacus*, the ventral process is much broader, stouter and more strongly curved in lateral view.

Distribution and natural history

The type locality is situated in the Qingcheng Shan, central Sichuan province, China (Fig. 45). The relatively low altitude (650–700 m) suggests that the species may be widespread in China.

japonicus group

Stilicoderus japonicus Shibata, 1968 (Fig. 60)

Stilicoderus japonicus Shibata, 1968: 8 f.
Stilicoderopsis malaisei Scheerpeltz, 1965: 183 ff., secondary homonym; **n. syn.**
Stiliderus scheerpeltzi Rougemont, 1986a: 185, replacement name; **n. syn.**

Material examined

Japan: 2 exs., Hokkaido, Ebetsu city, Nopporo Virgin Forest, sifted, 5.V.2006, leg. Lackner (cAss); 1 ex., Hokkaido, Nopporo Virgin Forest, sifted, X.2009, leg. Lackner (cAss); 1 ex., Hokkaido, Nopporo Virgin Forest, X.2008, leg. Lackner (cAss); 1 ex., Hokkaido, 7.VI.2008, leg. Lackner (cAss); 8 exs., Hokkaido, Nopporo Forest Park, 24.V. & 5.VI.2008, leg. Lackner (cAss); 1 ♀, Honshu, Shiga, Hourai mt., Kojorou valley, 4.V.1994, leg. Ito (SDEI).

China: 1 ex., Shaanxi, Foping Nat. Res., Panda area, 33°45'N, 107°48'E, 1600 m, 6.–11.IV.1999, leg. Sinaiev & Plutenko (cSch); 1 ex., Shaanxi, Foping Nat. Res., 33°51'N, 107°57'E, 1600 m, 20.IV.–11.V.1999, leg. Sinaiev & Plutenko (cSch); 1 ex., S-Shaanxi, Qinling Shan, 115 km WSW Xi'an, river bank above Houzhenzi, 33°50'N, 107°47'E, 1450 m, mixed deciduous forest, 5.VII.2001, leg. Schülke (cSch); 1 ex., S-Shaanxi, Qinling Shan, 105 km SW Xi'an, pass on road Zhouzhi–Foping, N-slope, 30°46'N, 107°58'E, 1700 m, small creek valley, mixed deciduous forest, moss sifted, 3.VII.2001, leg. Schülke (cSch); 5 exs., Shaanxi/Sichuan, Daba Shan, pass 20 km SSE Zhenping, 31°44'N, 109°35'E, 1700–1800 m, small creek valley, young mixed forest, leaf litter and moss sifted, 9.–12.VII.2001, leg. Schülke & Wrase (cSch, cAss); 2 ♂♂, 2 ♀♀, SE-Sichuan, Jinfo Shan, 29°01'N, 107°14'E, 1750 m, 26.VI.1998, leg. Smetana [C69] (cSme, cAss); 1 ♂, 1 ♀, W-Henan, Funiu Shan, Baotianman, 33°31'N, 111°56'E, 1500–1750 m, 6.–7.VII.2006, leg. Turna (NHMW, cAss); 4 exs., W-Hubei, Daba Shan, 12 km NW Muyuping, pass E Mt. Shennongjia, 31°30'N, 110°21'E, 1950 m, 16.VII.2001, leg. Schülke (cSch, cAss); 1 ex., same data, but 22.VII.2001 (cSch); 5 exs., N-Yunnan, Diqing Tibet Aut. Pref., Deqin Co., Meili Xue Shan, E-side, 12 km SW Deqin, 28°26'N, 98°49'E, 2890 m, creek valley, mixed forest with bamboo, 9. & 13.VI.2005, leg. Wrase (cSch, cAss); 2 exs., Yunnan, Nujiang Lisu Aut. Pref., Gaoligong Shan, side valley 18 km NW Liuku, 25°58'N, 98°42'E, 2590 m, degraded primary forest, litter sifted, 9.–10.VI.2007, leg. Wrase (cSch, cAss); 1 ex., Nujiang Lisu Aut. Pref., Nu Shan, 7 km NNW Coajian, 25°43'N, 99°08'E, 2420 m, secondary pine forest with shrubs, litter and bark sifted, 11.VI.2007, leg. Schülke (cSch).

Comment

According to Rougemont (1986a), the type material of *Stilicoderopsis malaisei*, a secondary homonym he replaced with the nomen novum *Stiliderus scheerpeltzi*, is

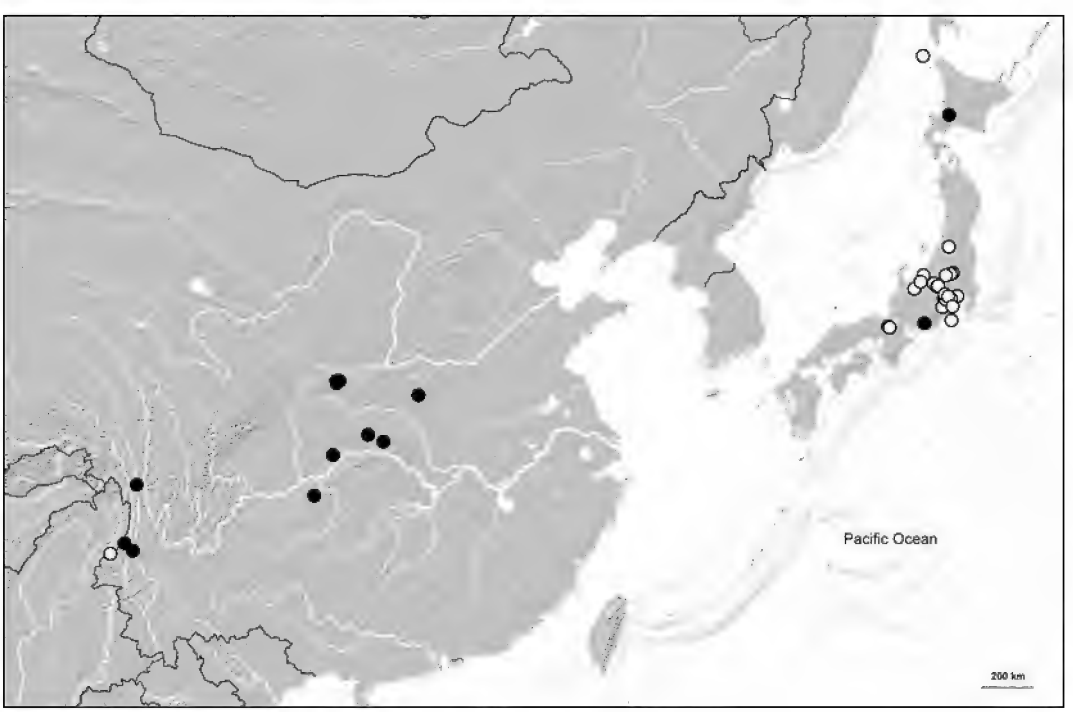


Fig. 60. Distribution of *Stilicoderus japonicus*. – Filled circles: examined records; open circles: literature records.

distinguished from *S. japonicus* by larger size and minor differences in head shape and punctation. An examination of the above material, however, revealed that these characters are variable and that the types of *S. scheerpeltzi* fall within the range of intraspecific variation of *S. japonicus*. Above all, the aedeagus and the shape of sternite VIII of the holotype (of *S. malaisei*) are identical to that of *S. japonicus* males from Japan, as can be inferred from the illustrations provided by ROUGEMONT (1986a), so that *S. scheerpeltzi* (and its synonym *Stilicoderopsis malaisei*) are placed in synonymy with *S. japonicus*.

The distribution of *S. japonicus* ranges from eastern Myanmar across China to Japan (Fig. 60). For additional records from Japan see SHIBATA (1968), WATANABE (1994), and ROUGEMONT (1985a, 1986a, 1996).

Stilicoderus formosanus Rougemont, 1996

Material examined

Taiwan: 8 exs., Chiayi Co., Alishan, road 18, km 85, 2000 m, forest litter, 11.IV.2009, leg. VÍT (cAss); 1 ex., Chiayi Co., Alishan, National Scenic Area, road 18, km 84, 2100 m, in decaying trunk, 8.I.2009, leg. VÍT (cAss); 1 ex., Hsinchu Co., Hsinkuang trib. vill., road 60, km 48, Jienshih, 1800 m, mountain forest, 25.III.2008, leg. VÍT (cAss).

China: 2 exs., Fujian, Wuyi Shan Nat. Res., Sangan env., 900 m, 30.V.–12.VI.2001, leg. HLAVÁČ & COOTER (cAss).

Comment

This species was previously known only from Taiwan (ROUGEMONT 1996, SHIBATA 2002). The above material from Fujian represents the first record from China. SMETANA (2004) lists the species from Sichuan, but this record refers to the following species.

Stilicoderus continentalis Rougemont, in litt.

Material examined

China: 1 ex., Sichuan, Qingcheng Shan, NW Chengdu, 30°54'N, 103°32'E, 3.–4.VI.1997, leg. SCHÜLKE (cAss).

Comment

According to a manuscript made available to me by GUILLAUME DE ROUGEMONT, this species will be described in the near future and the above specimen will be a paratype.

granulifrons group

Stilicoderus granulifrons (Rougemont, 1985)

Material examined

China: 3♂♂, 4♀♀ [1♀ teneral], Yunnan, Baoshan Pref., Gaoligong Shan, 32 km SE Tengchong, W pass, 24°51'N, 98°44'E, 1600 m, cleft with degraded primary forest, litter sifted, 28.VIII.2009, leg. SCHÜLKE & WRASE (cSch, cAss).

Comment

What was intended as the original description of *S. granulifrons* is based on unique female from "(Burma) Carin Ghecu" (ROUGEMONT 1986a). However, in describing and illustrating the male sexual characters of material from three localities in Meghalaya, northeastern India, ROUGEMONT (1985a) had already made the name available in an article published in the previous year. Additional records from Thailand and Nepal were reported by ROUGEMONT (1996). Judging from the illustrations of the aedeagi of males from different regions, however, *S. granulifrons* sensu ROUGEMONT (1996) may be composed of at least two species. The above specimens represent the first record from China.

aerosus group

Stilicoderus caprarius **n. sp.**
(Figs. 61–68)

Type material

Holotype ♂: "Indonesia W-Papua, ca. 130 km SE Kaimana, Omba (= Yamor) river, 10–20 km from coast / S4°05'49", E134°54'09", 10–20 m, 09.–11.II.2011, leg. A. WEIGEL 008 / Holotypus ♂ *Stilicoderus caprarius* sp. n. det. V. ASSING 2012" (NME).

Etymology

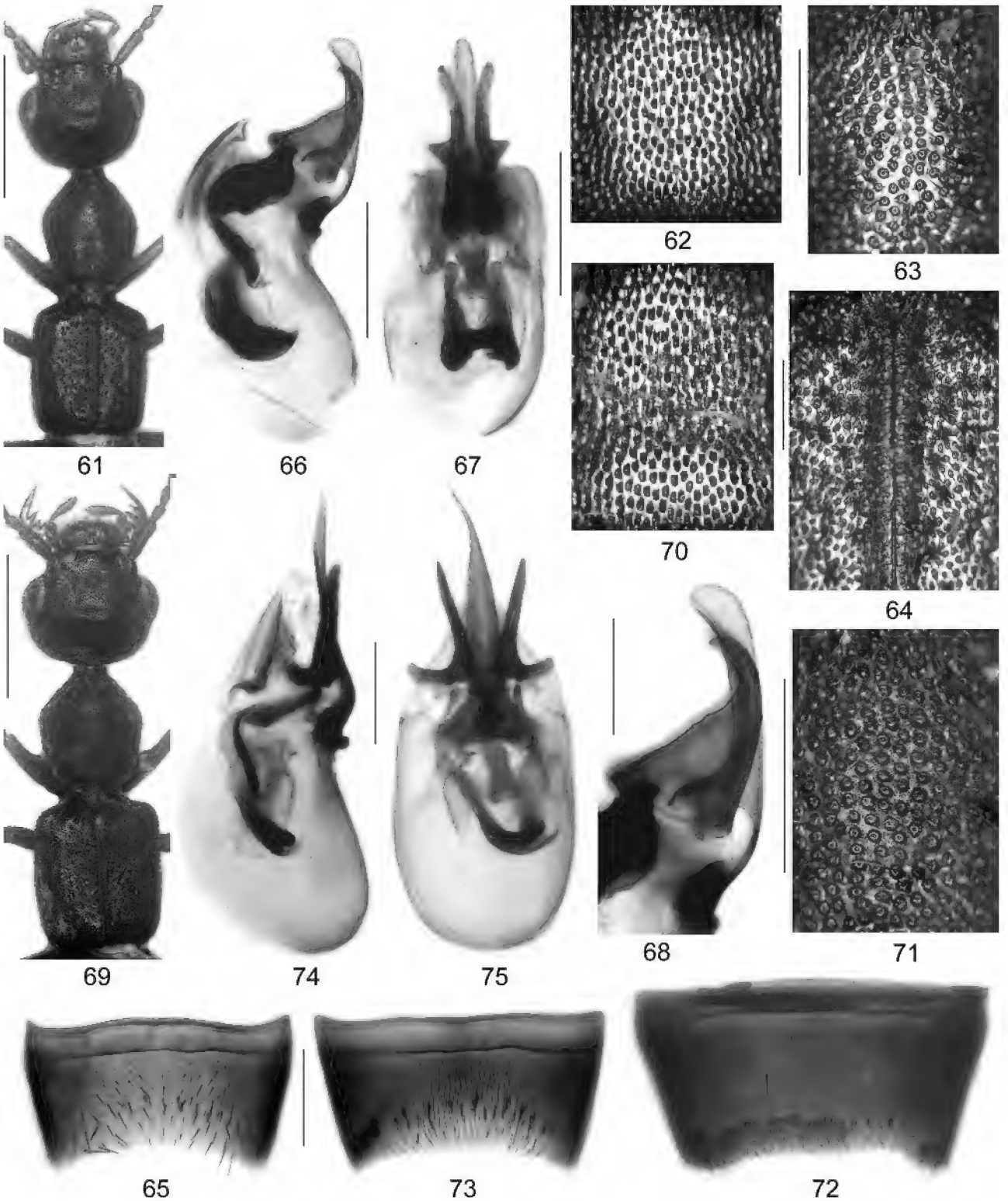
The specific epithet (Latin, adjective: goat-like, of a goat) alludes to the shape of the apical structures of the aedeagus.

Description

Body length 4.8 mm; length of forebody 2.9 mm. Coloration: body blackish-brown; legs and antennae reddish.

Head transverse, 1.2 times as broad as long, widest across eyes (Fig. 61), behind eyes smoothly curving towards posterior constriction; posterior angles completely obsolete; punctation dense, relatively fine, and defined, punctures somewhat oblong (Fig. 62); interstices without microsculpture, narrower than diameter of punctures. Eyes large and bulging, approximately 0.8 times as long as the distance from posterior margin of eye to posterior constriction.

Pronotum (Fig. 61) approximately 1.1 times as long as broad and 0.75 times as wide as head; punctation very dense, relatively fine, and granulose (Fig. 63); interstices very narrow, but noticeably glossy at higher magnification; midline without impunctate band.



Figs. 61–75. *Stilicoderus caprarius* (61–68) and *S. acutissimus* (69–75). – **61**, **69**. Forebody. **62**, **70**. Median dorsal portion of head. **63**, **71**. Median portion of pronotum. **64**. Median portion of elytra. **65**, **73**. Male sternite VIII. **66**, **74**. Aedeagus in lateral view. **67**, **75**. Aedeagus in ventral view. **68**. Apex of aedeagus in lateral view. **72**. Male sternite VII. – Scale bars: 0.5 mm (61, 69), 0.2 mm (62–68, 70–75).

Elytra slightly longer and distinctly broader than pronotum (Fig. 61); surface with dense, fine, granulose ground punctation and with irregularly spaced, laterally somewhat seriate, interspersed larger punctures (Fig. 64). Hind wings fully developed. Tarsi moderately slender; metatarsomere I shorter than the combined length of II and III; tarsomeres IV simple.

Abdomen narrower than elytra; punctation very fine and dense; posterior margin of tergite VII with palisade fringe.

♂: tergite VIII with weakly convex posterior margin; posterior margin of sternite VII broadly concave and with long black submarginal setae, these setae more numerous laterally than in the middle; sternite VIII strongly transverse and with broadly concave posterior margin (Fig. 65); aedeagus approximately 0.6 mm long, with weakly sclerotised and slender ventral process, and with distinctly sclerotised apical structures of distinctive shape (Figs. 66, 68).

Comparative notes

Based on external and the male sexual characters, *S. caprarius* belongs to the *S. aerosus* species group, which previously comprised four species from New Guinea and Australia (Rougemont 1996); for characters separating this group from other species groups see Rougemont (1986a). *Stilicoderus caprarius* is reliably distinguished from other *Stilicoderus* species particularly by the morphology of the aedeagus. It is additionally separated from other species of the *aerosus* group as follows:

from *S. aerosus* Last, 1964 (New Guinea) by smaller size (*S. aerosus*: 5.5–6.0 mm), the absence of a long pale pubescence on the forebody, and by the shape of the male sternite VIII (*S. aerosus*: sternite VIII with a small shallow emargination);

from *S. solitarius* Last, 1964 (New Guinea) by slightly smaller size (*S. solitarius*: 5.2 mm), the more transverse head, and by the larger and more convex eyes;

from *S. lasti* (Rougemont, 1986) (New Guinea) by smaller size (*S. lasti*: 5.5 mm), different head shape (*S. lasti*: posterior angles marked), and by the larger and more bulging eyes;

from *S. peninsularis* Rougemont, 1996 (Australia) by the absence of long pale pubescence on the head and pronotum, the more oblong pronotum, and by the modified male sternite VII.

For (re-)descriptions and illustrations of the compared species see Rougemont (1986a, 1995).

Distribution and natural history

The type locality is situated in the west of the Indonesian part of New Guinea, approximately 25 km to the east of Modowi. The holotype was collected near a stream at an altitude of 10–20 m.

Stilicoderus acutissimus **n. sp.**
(Figs. 69–75)

Type material

Holotype ♂: "Indonesia W-Papua, ca. 130 km SE Kaimana, Omba (= Yamor) river, 10–20 km from coast, S4°05'49", E134°54'09", 10–20 m, 09.–11.II.2011, leg. A. Skale (008) / Holotypus ♂ *Stilicoderus acutissimus* sp. n. det. V. Assing 2012" (NME).

Etymology

The specific epithet (superlative of the Latin adjective acutus: sharp) alludes to the shape of the ventral process of the aedeagus.

Description

Body length 5.1 mm; length of forebody 3.1 mm. Coloration: body blackish; legs brown with dark-brown femora; antennae dark-brown.

Head transverse, 1.22 times as broad as long, widest across eyes (Fig. 69), behind eyes smoothly curving towards posterior constriction; posterior angles almost obsolete; punctation dense, relatively fine, and defined, punctures somewhat oblong (Fig. 70); interstices without microsculpture, narrower than diameter of punctures. Eyes large and bulging, approximately 0.8 times as long as the distance from posterior margin of eye to posterior constriction.

Pronotum (Fig. 69) approximately 1.1 times as long as broad and 0.75 times as wide as head; dorsal surface matt owing to the extremely dense, relatively fine and granulose punctation (Fig. 71); midline without impunctate band.

Elytra slightly longer and distinctly broader than pronotum (Fig. 69); surface with some shine, with dense, fine, granulose ground punctation, and with irregularly spaced, laterally somewhat seriate, interspersed larger punctures. Hind wings fully developed. Tarsi moderately slender; metatarsomere I shorter than the combined length of II and III; tarsomeres IV simple.

Abdomen narrower than elytra; punctation very fine and dense; posterior margin of tergite VII with palisade fringe.

♂: tergite VIII with weakly convex posterior margin; posterior margin of sternite VII broadly concave and with long black submarginal setae, these setae particularly dense laterally (Fig. 72); sternite VIII strongly transverse and with broadly concave posterior margin (Fig. 73); aedeagus approximately 0.85 mm long, with long, apically very acute, and somewhat asymmetric ventral process and with distinctly sclerotised apical structures of distinctive shape (Figs. 74, 75).

Comparative notes

Like the preceding species, *S. acutissimus* belongs to the *S. aerosus* species group. It is distinguished from other

species of this group particularly by the matt and extremely densely punctate pronotum, by the shape and chaetotaxy of the male sternite VII, as well as by the distinctive morphology of the aedeagus.

Distribution and natural history

The type locality and the circumstances of collection are identical to those of *S. caprarius*.

Unidentified and unnamed species

Stilicoderus sp. 1

Material examined

China: 3 ♀♀, W-Hubei, Daba Shan, creek valley 8 km NW Muyuping, 31°29'N, 110°22'E, 1550–1650 m, deciduous forest, moss sifted, 18.VII.2001, leg. Schülke (cSch); 1 ♀, S-Shaanxi, Daba Shan, 20 km NW Zhenping, creek valley SE pass, 31°59'N, 110°22'E, 1680 m, 11.VII.2001, leg. Schülke (cSch).

Comment

This species of the *S. signatus* group is characterised by large body size (length of forebody: 4.3–4.4 mm) and large elytral spots.

Stilicoderus sp. 2

Material examined

China: 1 ♀, Yunnan, 1 km W Haba, Haba Xueshan Mts., 27°22'N, 100°08'E, 2750 m, margin of mixed forest near small stream, leaves and wet detritus sifted, 19.VI.2007, leg. Hájek & Růžička (cSch).

Comment

This species, too, belongs to the *S. signatus* group. It is similar to the preceding species, but has smaller elytral spots, extensively darkened legs, and is more coarsely punctate on the pronotum and the elytra.

Stilicoderus sp. 3

Material examined

China: 1 ♀, Yunnan, Nujiang Lisu Aut. Pref., creek valley 3 km SE Gongshan, 27°43'N, 98°41'E, 1450–1500 m, litter and moss sifted, 5.VI.2007, leg. Wrase (cSch); 1 ♀, Yunnan, Nujiang Lisu Aut. Pref., Salween side valley 5 km S Fugong, road SS 228, km 223, creek bank, litter sifted, 8.VI.2007, leg. Wrase (cSch).

Comment

The above specimens are highly similar to, and possibly conspecific with *S. signatus*. Males would be needed to confirm the identification.

Stilicoderus sp. 4

Material examined

China: 1 ♀, Yunnan, Diqing Tibet. Aut. Pref., Zhongdian Co., small cleft W Yangtze Kiang, 33 km WNW Zhongdian, 27°57'N, 99°24'E, creek bank, under gravel and in soil, 4.VI.2005, leg. Wrase (cSch).

Comment

This rather large species (length of forebody: 4.6 mm) is characterised by the robust, uniformly blackish body, very dense and non-granulose punctation of the head, the densely and granulosely punctured pronotum, and the moderately shiny elytra with moderately coarse macropunctures.

Stilicoderus sp. 5

Material examined

China: 2 ♀♀, Sichuan, Ganzi Tibet. Aut. Pref., Luding Co., W Erlang Shan pass, 7 km SSE Luding, 29°51'N, 102°15'E, 2600 m, 20.–29.VI.1999, leg. Wrase (cSch).

Comment

The above females are similar to *S. japonicus*, but distinguished by smaller body size, a more sparsely punctured head, and the presence of distinct macropunctures on the elytra.

4.2 *Stiliderus*

cicatricosus group

Stiliderus longicollis (Bernhauer, 1928)

Material examined

Borneo: 2 exs., Sabah, 25 km SE Sapulut, Batu Pungul env., flight interception trap, V.2001, leg. Kodada & Čiampor (cAss).

Comment

According to Rougemont (1996), the known distribution of this species is confined to Borneo and Palawan.

Stiliderus cardamomensis Rougemont, 1996

Material examined

India: 3 exs., Goa, Canacona District, Cortigao Sanctuary, 100 m, primary forest, 6.–10.I.1997, leg. Schulz & Vock (cAss).

Comment

The original description of *S. cardamomensis* is based on a male holotype from "S. India, Kerala Cardamom Hills,

10 km SW Kumily, 77°07'E 09°31'N, Vallakadavu" and a female paratype from a nearby locality (ROUGEMONT 1996).

Stiliderus crassus (Kraatz, 1859)

Material examined

India: 1 ♂, Tamil Nadu, 10 km N Pondicherry, Auroville, Discipline Forest, leaf litter, 26.I.2009, leg. BURGER (cAss).

Comment

According to ROUGEMONT (1996), *S. crassus* is widespread in the Oriental region, from India to Sulawesi (Indonesia).

Stiliderus smetanai Rougemont, 1986
(Fig. 76)

Material examined

India: 3 exs., Uttar Pradesh, Rajaji National Park, 10 km SE Dehra Dun, 600–700 m, 10.X.1996, leg. SCHULZ & VOCK (cAss); 3 exs., Uttarakhand, 14 km E Uttarkashi, 30°45'N, 78°34'E, 1450 m, 10.–12.IV.2012, leg. SHAVRIN (cSha, cAss).

Comment

This species was previously known only from Nepal (ROUGEMONT 1986b, 1996, SMETANA 2004). The above specimens represent the first records from India. The currently known distribution is mapped in Fig. 76.

Stiliderus occidentalis Rougemont, 1986
(Fig. 76)

Material examined

India: 36 exs., Uttarakhand, Kosi river valley, 5 km N Ramnagar, 29°26'N, 79°08'E, 23.–26.IV.2012, leg. SHAVRIN (cSha, cAss); 7 exs., Uttarakhand, 15 km SW New Tehri, 30°16'N, 78°22'E, 870 m, 18.–20.IV.2012, leg. SHAVRIN (cSha, cAss); 1 ex., Uttarakhand, left side of Kosi river, 5 km N Ramnagar, "N29°432 E79°140", 7.–11.VI.2011, leg. SHAVRIN (cSha).

Comment

The known distribution of *S. occidentalis* is confined to northern India (ROUGEMONT 1986d, SMETANA 2004). The currently known distribution is mapped in Fig. 76.

Stiliderus expectatus Rougemont, 1986

Material examined

Indonesia: 5 exs., Bali, Kebun Raya, 1600 m, 4.II.1994, leg. PEDERSEN (ZMUC, cAss).

Comment

This species was originally described from Bali and subsequently reported from additional localities in Thailand, Malaysia, and the Sunda Islands (ROUGEMONT 1996).

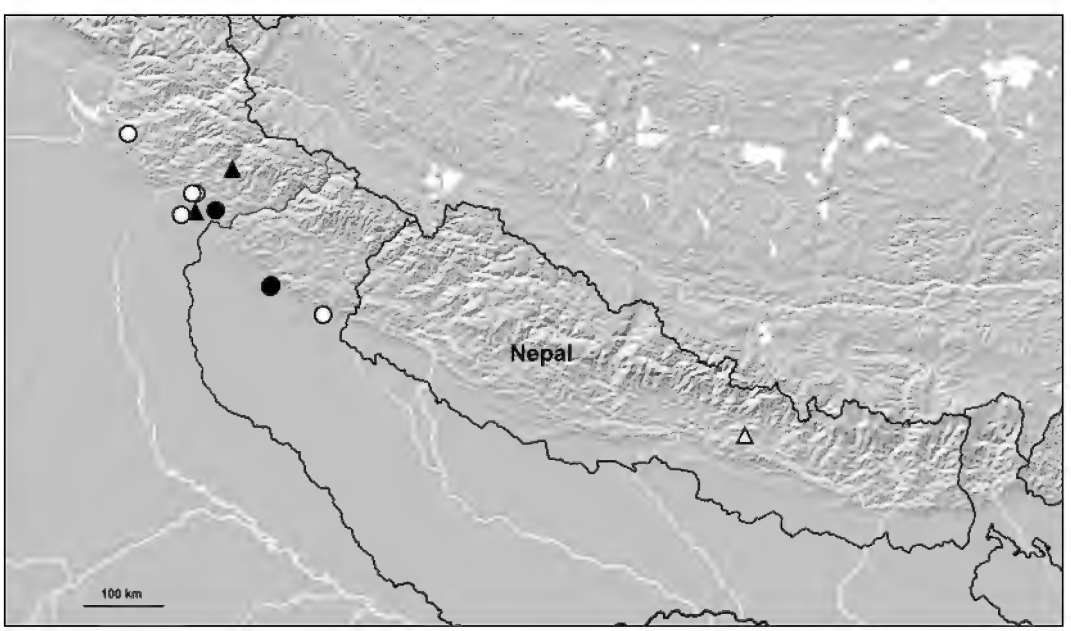


Fig. 76. Distribution of *Stiliderus* species in the Himalaya: *S. occidentalis* (circles); *S. smetanai* (triangles). – Filled symbols: examined records; open symbols: literature records.

Stiliderus celebensis Rougemont, 1985

Material examined

Indonesia: 1 ♂, N-Sulawesi, 1 km S Sawangan, Sawangan River, near River Park Resort, 1°22'N, 124°57'E, 250–300 m, 8.I.2006, leg. Weigel (NME).

Comment

According to Rougemont (1985b, 1996), the distribution of *S. celebensis* is confined to Sulawesi.

Stiliderus ocreatus **n. sp.**
(Figs. 77–81)

Type material

Holotype ♂: "Indonesia, Bali, Kebun Raya, c. 1600 m, 4.II.1994, J. Pedersen / Holotypus ♂ *Stiliderus ocreatus* sp. n. det. V. Assing 2012" (ZMUC).

Paratypes: 2 ♀♀: same data as holotype (ZMUC, cAss).

Etymology

The specific epithet (Latin, adjective: with a splint) refers to the conspicuous posterior process of the male sternite VII.

Description

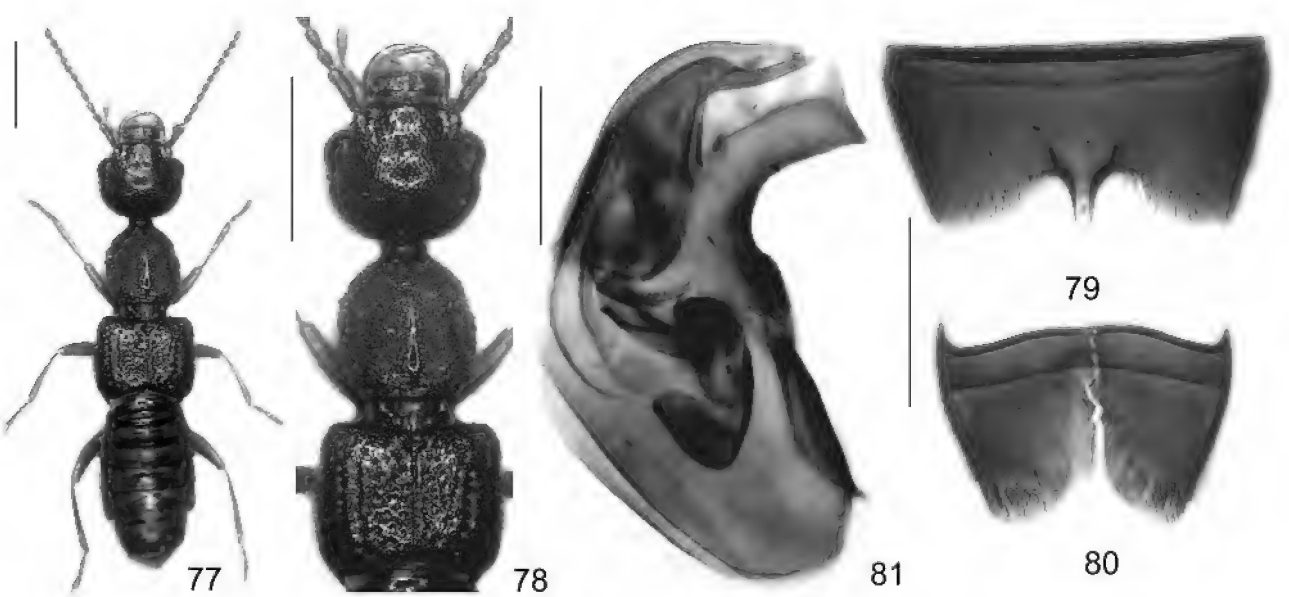
Body length 5.2–5.6 mm; length of forebody 3.2–3.4 mm. Habitus as in Fig. 77. Coloration: forebody blackish; abdomen blackish brown; legs reddish-brown to dark-brown; antennae dark-brown.

Head (Fig. 78) distinctly transverse, 1.12–1.20 times as broad as long; punctation defined, rather coarse and dense, slightly sparser in median dorsal portion; interstices narrower than diameter of punctures (except in median dorsal portion), but distinctly glossy and without microsculpture. Eyes strongly bulging, approximately 0.6–0.7 times as long as distance from posterior margin of eye to posterior constriction.

Pronotum (Fig. 78) strongly convex in cross-section, approximately 1.1 times as long as broad and 0.85 times as wide as head; lateral margins somewhat serrulate, anterior angles acutely dentate; punctation very dense and coarsely granulose; midline with glossy impunctate band only in posterior half; on either side of this impunctate band with impression; anterior median portion (i. e., the portion adjacent to posterior constriction of head) almost impunctate and glossy, this sparsely or impunctate area shaped like an inverse triangle (i. e., apex facing caudad).

Elytra (Fig. 78) short and strongly transverse, approximately 0.7 times as long as pronotum; punctation composed of moderately dense micropunctation and interspersed macropunctures, these macropunctures irregularly spaced in internal half and somewhat seriate in lateral half of elytron. Hind wings apparently fully developed. Tarsi short and stout; tarsomeres IV distinctly bilobed; metatarsomere I shorter than the combined length of II and III.

Abdomen approximately as broad as elytra or nearly so; surface with distinct, but very fine microsculpture, almost matt; punctation dense and extremely fine, barely no-



Figs. 77–81. *Stiliderus ocreatus*. – **77**. Habitus. **78**. Forebody. **79**. Male sternite VII. **80**. Male sternite VIII. **81**. Aedeagus in lateral view. – Scale bars: 1.0 mm (77–78), 0.5 mm (79–80), 0.2 mm (81).

ticeable in the microsculpture; posterior margin of tergite VII with palisade fringe.

♂: sternite VII (Fig. 79) strongly transverse and with conspicuous modifications, posterior margin distinctly concave in the middle, in median dorsal portion with splint-like process (clearly visible also in lateral view); sternite VIII transverse, with distinct median impression, and with moderately deep, almost V-shaped posterior excision (Fig. 80); aedeagus 0.65 mm long, ventral process stout and curved, dorso-apically with pectinate structures, apical internal structure with large base and spine-like apex (Fig. 81).

Comparative notes

Stiliderus ocreatus is distinguished from the externally highly similar *S. expectatus*, which was found in the same locality, only by the slightly longer, narrower, and more glossy impunctate median band in the posterior half of the pronotum, the presence of an anterior, triangle-shaped, sparsely punctate or impunctate area on the pronotum (close to the posterior constriction of the head), by the conspicuous modifications of the male sternite VII, as well as by the completely different morphology of the aedeagus. For illustrations of the male sexual characters of *S. expectatus* see ROUGEMONT (1986c).

Distribution and natural history

The type locality is situated in Bali at an altitude of 1600 m. The specimens were collected in February.

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On the Staphylinidae (Coleoptera) of Crete, Greece

Volker Assing

Abstract

Approximately 105 species of Staphylinidae collected in spring 2012 are reported from the eastern and central parts of the Greek island Crete. Nine species, seven of Aleocharinae and two of Paederinae, are described and illustrated. Three of them are associated with ants, at least seven are probably locally endemic: *Myrmecopora (Myrmecopora) idana* **n. sp.** (Psiloritis; associated with *Messor* sp.), *Aloconota (Aloconota) brachyptera* **n. sp.** (Dikti Oros, Psiloritis), *Geostiba (Sipalotricha) diktiana* **n. sp.** (Dikti Oros), *Dinusa cretica* **n. sp.** (Dikti Oros; associated with *Messor* sp.), *Oxypoda (Bessopora) idana* **n. sp.** (Psiloritis), *Tectusa diktiana* **n. sp.** (Dikti Oros), *T. thriptica* **n. sp.** (Orno Thriptis), *Astenus (Eurysunius) thripticus* **n. sp.** (Orno Thriptis; associated with *Tetramorium* sp.), and *Sunius diktianus* **n. sp.** (Dikti Oros). The sexual characters of several previously described species are illustrated. A checklist of the 63 named endemic species and subspecies of Crete is provided. The zoogeographic affiliations of the Cretan endemics are discussed.

Keywords: Coleoptera, Staphylinidae, West Palaearctic region, Mediterranean, Greece, Crete, new species, endemism, myrmecophily, zoogeography, taxonomy.

Zusammenfassung

Freilanduntersuchungen in den östlichen und zentralen Regionen der griechischen Insel Kreta ergaben etwa 105 Arten aus der Käferfamilie Staphylinidae. Neun Arten, davon sieben Aleocharinae und zwei Paederinae, werden beschrieben und abgebildet. Drei dieser Arten sind myrmecophil und mindestens sieben sind wahrscheinlich lokalendemisch auf Kreta verbreitet: *Myrmecopora (Myrmecopora) idana* **n. sp.** (Psiloritis; bei *Messor* sp.), *Aloconota (Aloconota) brachyptera* **n. sp.** (Dikti Oros, Psiloritis), *Geostiba (Sipalotricha) diktiana* **n. sp.** (Dikti Oros), *Dinusa cretica* **n. sp.** (Dikti Oros; bei *Messor* sp.), *Oxypoda (Bessopora) idana* **n. sp.** (Psiloritis), *Tectusa diktiana* **n. sp.** (Dikti Oros), *T. thriptica* **n. sp.** (Orno Thriptis), *Astenus (Eurysunius) thripticus* **n. sp.** (Orno Thriptis; bei *Tetramorium* sp.) und *Sunius diktianus* **n. sp.** (Dikti Oros). Die Sexualmerkmale einiger weiterer, bereits beschriebener Arten werden abgebildet. Eine Liste der 63 derzeit von Kreta bekannten endemischen Arten und Unterarten wird erstellt. Die zoogeographischen Beziehungen der Kreta-Endemiten werden diskutiert.

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1 Introduction

With an area of approximately 8340 km^2 and a west-east extension of about 260 km, the Greek island Crete is the fifth-largest island of the Mediterranean Sea. The nearest distance from the peninsulas in the northwest to the southernmost tip of the Pelopónnisos is 100 km, that from the northeast to the nearest parts of mainland Turkey nearly 200 km, to the southernmost tip of the Greek island Rhodos about 150 km, and from the south coast to the coast of Libya nearly 300 km. The topology of Crete features numerous mountain ranges, the four major ones being the Lefka Ori in the west, the Psiloritis in the centre, the Dikti range in the east, and the Orno Thriptis in the extreme east. In the Miocene, before the Zanclean flood near the end of the Miocene (approximately 5.3 ma before the present), what is Crete today was connected to both southern mainland Greece and southwestern Anatolia via land ridges.

Although Crete has had a long tradition of entomological research, there is not a single comprehensive study such as a monograph, catalogue, or checklist of its Staphylinidae fauna. The only more comprehensive faunistic and taxonomic studies specifically dealing with the fauna of Crete

are those by Blattný & Blattný (1916), on the Pselaphinae and Scydmaeninae collected by Paganetti in 1914, and by Scheerpeltz (1964), who lists 70 named species of Staphylinidae (exclusive of Pselaphinae, Scydmaeninae, and Scaphidiinae). Other records from Crete are found either in articles dealing with the fauna of Greece as a whole (e. g., Assing 2002, 2004a, 2006a), in revisions of species groups or genera (e. g., Assing 1997, 1999, 2004b, 2005a, 2005b, 2007a, 2007b, Lohse & Steel 1961), in taxonomic synopses of higher systematic units (e. g., Assing 2008b, Coiffait 1972, 1978, 1982, 1984, Zerche 1990), or in articles containing descriptions of single species (e. g., Assing 2003, Pace 2002, Sabella 2002).

According to Smetana (2004) and an update by Schülke (unpubl.), 1435 species and subspecies of Staphylinidae have been recorded from Greece as a whole, approximately 55 of which are confined to Crete.

The discovery of various new species of Staphylinidae collected by Heinrich Meybohm during several excursions to Crete, among them a species of *Tectusa* Bernhauer, 1899 from the Lefka Ori, gave rise to the assumption that more undescribed species were present on the island. Previous observations in the Pelopónnisos had shown that virtually all the major mountain ranges in southern Greece are inhabited by at least one locally endemic species of *Tectusa*, suggesting that other Cretan mountain ranges were not unlikely to host species of this genus, too. A field trip conducted to eastern and central Crete in spring 2012 by the author not only confirmed this assumption, but also yielded an unexpected number of other discoveries.

Acknowledgements

I am indebted to Volker Brachat (Geretsried) and Heinrich Meybohm (Großhansdorf) for identifying the species of Pselaphinae and Scydmaeninae, respectively, and for providing additional information on the Cretan Pselaphinae and Scydmaeninae fauna. György Makranczy (Budapest) identified *Ochthephilus venustulus*, Michael Schülke (Berlin) *Mycetoporus* spp., *Tachyporus abner*, and *Anotylus complanatus*, and Walter Rossi (L'Aquila) the Laboulbeniales on one specimen of *Geostiba*. Benedikt Feldmann (Münster) and Heinrich Terlutter (Billerbeck) reviewed the manuscript.

2 Material and methods

The Pselaphinae and Scydmaeninae referred to in this study are deposited in the private collections of Volker Brachat and Heinrich Meybohm, respectively. The remaining material is deposited in the following public and private collections:

cAss	author's private collection
cFel	private collection Benedikt Feldmann, Münster
cSch	private collection Michael Schülke, Berlin
cWun	private collection Paul Wunderle, Mönchengladbach
MNHUB	Museum für Naturkunde der Humboldt-Universtität, Berlin

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). For the photographs a digital camera (Nikon Coolpix 995) was used.

Head length was measured from the anterior margin of the clypeus (Aleocharinae) or from the anterior margin of the frons (Paederinae) to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, total length from the anterior margin of the mandibles (in resting position) to the apex of the abdomen, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, and the length of (the median lobe of) the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The side of the aedeagus with the sperm duct opening is referred to as the ventral, the opposite side as the dorsal aspect.

The individual labels of type specimens are separated by slashes; they are cited in the original spelling and format, except that the following adaptations were made according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics.

3 Results

3.1 Staphylinidae recorded from eastern and central Crete in 2012

In all, 1922 specimens of Staphylinidae belonging to approximately 105 species were collected. Remarkably, at least ten previously undescribed species were discovered, not counting the species of Pselaphinae and Scydmaeninae that had been collected before, but never described. It was not possible to name some of the species either because the respective genera [e. g., *Hydrosmecta* spp.] or subgenera [*Atheta (Mocyta)* spp., *Atheta (Microdota)* sp., *Oxypoda (Baeoglena)* spp.] are currently in taxonomic confusion and in need of revision, or because the species were represented only by females.

A complete list of species and records from 2012 is given below. The subfamilies are arranged according to Smetana (2004). The genera and species within the subfamilies are listed in alphabetical order. The number of specimens is given in parentheses after the locality number.

Localities and collection data (all leg. Assing) corresponding to the sample numbers of the list below are as follows: **1**: Orno Thriptis, SE Thripti, 35°05'N, 25°53'E, 1250 m, partly flooded plateau, under stones, partly near road margin, 25.III.; **2**: same data, but 6.VI.; **3**: Orno Thriptis, SE Thripti, 35°05'N, 25°53'E, 1270 m, E-slope, oak litter and grass near small snowfield sifted, 25.III.; **4**: Orno Thriptis, SE Thripti, 35°05'N, 25°53'E, 1290 m, grass and litter under old oak trees sifted, 25.III.; **5**: Orno Thriptis, SE Thripti, 35°05'N, 25°53'E, 1120 m, grassy N-slope with oak, grass and oak litter sifted, 25.III.; **6**: same locality, but under stones, 6.IV.; **7**: Orno Thriptis, E Thripti, 35°06'N, 25°53'E, 970 m, N-slope, moist pasture, under stones, 6.IV.; **8**: Orno Thriptis, SE Thripti, 35°05'N, 25°53'E, 1300 m, litter and grass sifted, 6.IV.; **9**: WSW Sitia, Orno Oros, 35°09'N, 25°55'E, 545 m, under

stones, 31.III.; **10**: WSW Sitia, Orno Oros, 35°08'N, 25°56'E, 640 m, under stones, 31.III.; **11**: SW Agios Nikolaos, S Neapoli, 35°14'N, 25°17'E, 410 m, road margin, under stones, 26.III.; **12**: NW Agios Nikolaos, 35°13'N, 25°38'E, 290 m, swept from flowering *Sarothamnus*, 30.III.; **13**: NW Ierapetra, Bramanon reservoir, 35°02'N, 25°42'E, 70 m, lakeshore, under stones, 29.III.; **14**: SW Agios Nikolaos, Kroustas, 35°09'N, 25°39'E, 430 m, oak forest, moss, grass, and litter sifted, 29.III.; **15**: WSW Agios Nikolaos, W Kritsa, Katharo plateau, 35°09'N, 25°33'E, 1120 m, arable land, litter and grass under old oak tree sifted, 24.III.; **16**: same data, but 1.IV.; **17**: WSW Agios Nikolaos, W Kritsa, Katharo plateau, 35°09'N, 25°36'21"E, 890 m, calcareous pasture, under stones, 1.IV.; **18**: WSW Agios Nikolaos, W Kritsa, Katharo plateau, 35°08'N, 25°35'E, 1140 m, arable land, grass and litter below old oak trees sifted, 1.IV.; **19**: WSW Agios Nikolaos, W Kritsa, Katharo plateau, 35°08'N, 25°34'E, 1130 m, arable land, under stones, 1.IV.; **20**: NE Lasithi plateau, 35°12'N, 25°31'E, 990 m, W-slope, pasture, under stones, 26.III.; **21**: Lasithi plateau, SE Agios Georgios, 35°03'N, 25°30'E, 900 m, under stones, 26.III.; **22**: Lasithi Plateau, S Mesa Lasithi, 35°11'N, 25°31'E, 840 m, oak forest, sifted, 28.III.; **23**: NW Dikti Oros, N Limnakaro, 35°09'N, 25°29'E, 1090 m, pasture, under stones, 26.III.; **24**: NW Dikti Oros, Limnakaro, 35°08'N, 25°29'E, 1170 m, E-slope with snow fields (Fig. 73), under stones, 26.III.; **25**: same data, but 27.III.; **26**: same data, but 28.III.; **27**: same data, but 30.III.; **28**: same data, but 7.IV.; **29**: NW Dikti Oros, Limnakaro, 35°08'N, 25°29'E, 1170 m, E-slope with snow fields (Fig. 73), sifted, 26.III.; **30**: same data, but 27.III.; **31**: same data, but 30.III.; **32**: NW Dikti Oros, Limnakaro, 35°08'N, 25°29'E, 1140 m, grassland, near snow fields, under stones, 28.III.; **33**: same data, but 30.III.; **34**: NW Dikti Oros, Limnakaro, 35°08'N, 25°29'E, 1140 m, near snow fields, sifted, 28.III.; **35**: NW Dikti Oros, S Limnakaro, 35°08'N, 25°29'E, 1330 m, N-slope, under stones near snowfields, 7.IV.; **36**: NW Dikti Oros, S Limnakaro, 35°08'N, 25°29'E, 1330 m, N-slope, litter and moss near snowfields sifted, 7.IV.; **37**: ESE Perama, N Garazo, 35°21'N, 24°47'E, 130 m, stream bank, gravel floated, 4.IV.; **38**: ca. 7 km NW Anogia, 35°19'N, 24°49'E, 440 m, stream valley, with mixed Mediterranean vegetation, litter sifted, 4.IV.; **39**: S Anogia, Psiloritis, N Nida plateau, 35°16'N, 24°53'E, 1150 m, N-slope, below snowfields, under stones, 2.IV.; **40**: S Anogia, Psiloritis, N Nida plateau, 35°14'N, 24°53'E, 1280 m, litter and grass below shrubs near snowfields sifted, 2.IV.; **41**: S Anogia, Psiloritis, 35°16'N, 24°54'E, 1060 m, road margin, under stones, 3.IV.; **42**: S Anogia, Psiloritis, 35°15'N, 24°53'E, 1180 m, pasture, under stones near snow, 3.IV.; **43**: S Anogia, Psiloritis, 35°15'N, 24°53'E, 1180 m, NE-slope with scattered oak, leaf litter and grass near snow sifted, 3.IV.; **44**: S Anogia, Psiloritis, 35°15'N, 24°53'E, 1170 m, pasture with oak, under stones near snow, 4.IV.; **45**: S Anogia, Psiloritis, 35°15'N, 24°52'E, 1180 m, rocky N-slope with oak, litter and grass near snow sifted, 4.IV.; **46**: S Anogia, Psiloritis, 35°15'N, 24°52'E, 1180 m, rocky N-slope, pasture with oak, under stones, 5.IV.; **47**: S Anogia, Psiloritis, 35°16'N, 24°54'E, 1090 m, N-slope, pasture, under stones, 5.IV.

Omaliinae

Acidota cruentata Mannerheim, 1830 – 30 (1)
Boreaphilus fuelscheri Zerche, 1990 – 30 (1)
Omalium cinnamomeum Kraatz, 1857 – 8 (1), 40 (2), 43 (1), 45 (1)
Omalium excavatum Stephens, 1834 – 29 (1), 30 (1), 31 (2), 40 (3), 43 (3), 45 (3)
Omalium rugatum Mulsant & Rey, 1880 – 5 (1), 45 (1)

Proteininae

Megarthrus bellevoyei Saulcy, 1862 – 31 (1)
Proteinus creticus Assing, 2004 – 3 (5), 4 (1), 5 (23), 8 (1), 14 (1), 22 (3), 31 (6), 34 (7), 43 (23)
Proteinus ovalis Stephens, 1834 – 5 (10), 8 (1), 36 (2), 40 (1), 32 (32), 45 (6)

Pselaphinae

Afropselaphus n. sp. – 32 (1), 34 (5)
Brachygluta ochanensis (Reitter, 1909) – 14 (2)
Brachygluta n. sp. – 20 (1)
Tribatus creticus Reitter, 1884 – 13 (1), 21 (7)
Tychus reitterianus Löbl, 1998 – 5 (1), 15 (1), 16 (1), 37 (1)
Tychus n. sp. – 24 (1), 30 (3), 31 (3), 35 (1)

Tachyporinae

Mycetoporus baudueri Mulsant & Rey, 1875 – 30 (1), 36 (1)
Mycetoporus dispersus Schülke & Kocian, 2000 – 5 (1), 25 (1), 31 (3)
Mycetoporus reichei (Pandellé, 1869) (♀) – 40 (1)
Mycetoporus sp. aff. *bosnicus* Luze, 1901 – 5 (1), 14 (9), 16 (3), 18 (2), 40 (1), 45 (1)
Tachyporus abner Saulcy, 1865– 25 (2), 40 (1), 41 (1), 42 (7)
Tachyporus caucasicus Kolenati, 1846 – 14 (2), 34 (1)
Tachyporus hypnorum (Fabricius, 1775) – 15 (1)
Tachyporus nitidulus (Fabricius, 1781) – 3 (2), 4 (4), 8 (3), 15 (8), 16 (3), 18 (9), 25 (3), 28 (3), 29 (1), 30 (9), 31 (12), 34 (5), 36 (2), 39 (2), 40 (7), 42 (1), 43 (3)

Habrocerinae

Habrocerus pisidicus Korge, 1971 – 14 (5), 16 (1), 22 (45), 31 (1), 38 (3)

Aleocharinae

Aleochara bipustulata (Linnaeus, 1760) – 16 (1)
Aloconota brachyptera n. sp. – 24 (1), 27 (2), 28 (1), 29 (1), 30 (1), 31 (1), 32 (1), 33 (1), 39 (3), 42 (2)
Aloconota minoica Pace, 2002 – 37 (8)
Amischa n. sp. – 7 (2)
Atheta aeneicollis (Sharp, 1869) – 4 (7), 5 (1), 8 (2), 14 (2), 16 (2), 18 (1), 22 (1), 40 (3), 42 (1), 43 (4), 45 (2)
Atheta amicula (Stephens, 1832) – 4 (1), 39 (1)
Atheta cretica Brundin, 1944 (♀) – 7 (1)
Atheta nigra (Kraatz, 1856) – 16 (1)
Atheta oblita (Erichson, 1839) – 22 (1)
Atheta (*Microdota*) sp. – 31 (1)
Atheta (*Mocyta*) spp. – 1 (5), 3 (9), 4 (30), 5 (4), 8 (9), 12 (2), 14 (6), 15 (16), 16 (7), 18 (10), 20 (1), 22 (19), 28 (2), 30 (3), 31 (9), 32 (1), 38 (6), 39 (2), 49 (3), 42 (3), 43 (74), 47 (2)
Atheta sp. – 4 (1)
Cypha graeca Assing, 2004 – 14 (1)
Dinusa cretica n. sp. – 25 (1), 26 (1)
Drusilla cretica Assing, 2005 – 39 (1), 40 (8), 41 (1), 42 (1), 43 (1), 47 (29)
Geostiba diktiana n. sp. – 25 (2), 30 (43), 31 (86), 32 (6), 33 (2), 34 (65)

Geostiba exsecta Assing, 1999 – 40 (1), 42 (1), 43 (37), 45 (2)
Geostiba meybohmi Assing, 2000 – 15 (4), 18 (15)
Geostiba oertzeni (Eppelsheim, 1888) – 4 (5), 5 (2), 8 (3)
Geostiba thryptisensis Assing, 2001 – 5 (7), 8 (5)
Hydrosmecta sp. – 37 (28)
Hydrosmecta sp. – 37 (1)
Hydrosmecta sp. – 37 (42)
Liogluta longiuscula (Gravenhorst, 1802) – 3 (9), 4 (14), 5 (7), 8 (13), 16 (2), 24 (2), 25 (4), 30 (1), 31 (9), 35 (2), 35 (46), 39 (18), 40 (9), 42 (12), 43 (59), 45 (15)
Myrmecopora elisa Assing, 1997 – 24 (1), 25 (3), 28 (1)
Myrmecopora idana n. sp. – 47 (1)
Myrmecopora sp. (♀) – 1 (1)
Ocalea badia Erichson, 1837 – 18 (1), 29 (1), 30 (1), 31 (1), 36 (2), 40 (1)
Oxypoda bimaculata Baudi, 1870 – 25 (1), 27 (1), 31 (1)
Oxypoda cretica Assing, 2006 – 24 (1), 25 (1), 27 (2), 30 (1), 31 (1), 32 (16), 36 (1)
Oxypoda formosa Kraatz, 1856 – 29 (1), 30 (4), 31 (1)
Oxypoda idana n. sp. – 39 (1), 42 (1), 43 (1)
Oxypoda lurida Wollaston, 1857 – 31 (3), 34 (2)
Oxypoda subnitida Mulsant & Rey, 1875 – 43 (1)
Oxypoda (*brachyptera* group) sp. (♀♀) – 25 (2), 27 (1), 42 (1)
Oxypoda (*Baeoglena*) sp. – 40 (1), 45 (1)
Tectusa thriptica n. sp. – 3 (1)
Tectusa diktiana n. sp. – 36 (2)

Oxytelinae

Anotylus complanatus (Erichson, 1839) (♀) – 3 (1)
Anotylus inustus (Gravenhorst, 1806) – 3 (4), 4 (5), 8 (7), 9 (1), 14 (2), 25 (2), 28 (3), 34 (1), 39 (2), 40 (1), 42 (14), 44 (2)
Anotylus sculpturatus (Gravenhorst, 1806) – 14 (3), 39 (1), 42 (2), 43 (4)
Carpelimus corticinus (Gravenhorst, 1806) – 37 (6)
Carpelimus gracilis (Mannerheim, 1830) – 37 (1)
Ochthephilus venustulus (Rosenhauer, 1856) – 37 (6)

Steninae

Stenus cf. *cordatoides* Puthz, 1972 (♀) – 42 (1)
Stenus ochropus Kiesenwetter, 1858 – 31 (3), 34 (6), 36 (3)
Stenus parcior Bernhauer, 1929 – 10 (1), 32 (1), 40 (1)
Stenus subaeneus Erichson, 1840 – 23 (1), 35 (1), 36 (12), 42 (2), 43 (4), 44 (3), 45 (6), 46 (2)

Scydmaeninae

Leptomastax sp. aff. *bisetosa* Reitter, 1884 – 47 (1)
Scydmaenus menozzii Franz, 1966 – 7 (1)
Scydmoraphes minotauri Meybohm, 2008 – 37 (1)
Stenichnus creticus W. Blattný & C. Blattný, 1916 – 24 (1), 25 (1), 30 (4), 31 (5), 34 (8)

Paederinae

Astenus lyonessius (Joy, 1908) – 7 (3), 44 (1), 47 (2)
Astenus procerus (Gravenhort, 1806) – 9 (2), 26 (2), 33 (1), 47 (4)
Astenus thoracicus (Baudi, 1857) – 6 (1), 7 (3), 10 (2), 20 (7), 23 (1), 24 (1), 25 (2), 27 (1), 30 (7), 31 (2), 32 (11), 33 (4), 35 (3), 36 (2), 39 (2), 40 (8), 41 (3), 42 (2), 44 (1), 47 (55)
Astenus thripticus n. sp. – 7 (2)
Domene stilicina (Erichson, 1840) – 3 (1)
Leptobium creticum Coiffait, 1973 – 4 (1), 7 (2), 15 (3), 16 (1), 19 (2), 20 (1), 23 (7), 24 (1), 25 (8), 30 (4), 31 (9), 32 (11), 33 (3), 34 (1), 35 (10), 36 (1), 43 (1)
Leptobium thryptisense Assing, 2005 – 3 (2), 6 (1)
Medon dilutus pythonissa (Saulcy, 1865) – 5 (1), 8 (2), 14 (3), 22 (3), 38 (1), 43 (1), 45 (2)
Platydomene picipes picipes (Erichson, 1840) – 37 (1)
Scopaeus muehlei Frisch, 1994 – 13 (1), 37 (1)
Sunius diktianus n. sp. – 24 (15), 25 (7), 27 (7), 30 (4), 31 (1), 32 (58), 33 (11)
Sunius fallax (Lokay, 1919) – 7 (5), 15 (1), 40 (1), 42 (4), 44 (3)
Sunius sp. (*seminiger* group) (♀♀) – 13 (1), 19 (1)

Staphylininae

Gabrius nigritulus (Gravenhorst, 1802) – 37 (1)
Gabrius cf. *nigritulus* (♀♀) – 41 (1), 42 (2)
Heterothops cf. *minutus* Wollaston, 1860 – 16 (5), 43 (1)
Ocypus mus (Brullé, 1832) – 7 (2), 16 (1)
Ocypus olens (O. Müller, 1764) – 1 (1), 2 (2), 11 (1), 17 (1), 19 (1), 20 (4), 21 (1), 23 (1)
Ocypus picipennis (Fabricius, 1792) – 25 (1), 47 (1)
Othius laeviusculus Stephens, 1833 – 8 (1), 42 (2)
Othius lapidicola Märkel & Kiesenwetter, 1848 – 15 (12), 16 (24), 22 (5), 30 (3), 31 (5), 43 (14), 45 (12)
Philonthus nitidicollis (Lacordaire, 1835) – 42 (2), 43 (1), 47 (2)
Philonthus quisquiliarius (Gyllenhal, 1810) – 37 (2)
Philonthus rufimanus Erichson, 1840 – 37 (6)
Quedius humeralis Stephens, 1832 – 5 (2), 8 (1)
Quedius nemoralis Baudi, 1848 – 14 (1), 15 (1), 16 (3), 22 (1), 45 (1)
Quedius semiobscurus (Marsham, 1802) – 42 (1)
Quedius umbrinus Erichson, 1839 – 37 (1)
Xantholinus minos Assing, 2008 (♀) – 47 (1)

Remarks on some species

Boreaphilus fuelscheri (Figs. 72–73): This species was described based on six specimens from "Kreta Lassithi-Hochebene" (Zerche 1990) and subsequently recorded only once from "Dikti Oros, Selakano, 35°05'N, 25°32'E, 850 m" (Assing 2002). The available evidence suggests that it is endemic to the Dikti range. For photos of the habitat where it was collected see Figs. 72–73.

Proteinus creticus: This species was described based on three specimens from the Katharo plateau (Assing 2004a) and subsequently recorded from western Anatolia by Anlaş & Tezcan (2008) (specimen identified by A. Zanetti). As can be inferred from the localities and specimen numbers above, the species seems to be common in Crete and apparently replaces *P. brachypterus* (Fabricius, 1792) on the island.

Aloconota minoica (Figs. 20–23): The specimens listed represent the first record since the original description, which is based on a single female from "Kreta, Kato Zakros Schlucht" (Pace 2002). The species is fully winged and probably distributed in suitable habitats (stream banks) across Crete. The spermatheca of the recently collected material is in agreement with the

illustration provided by PACE (2002), suggesting that these specimens are conspecific with the holotype. The previously unknown male sexual characters are as follows: tergite VII with pronounced oblong median tubercle posteriorly; posterior margin of tergite VIII with two median teeth and with distinct lateral projection on either side (Fig. 20); ventral process of aedeagus (Figs. 21, 22) with rather broadly rounded apex in lateral view. The spermatheca is illustrated in Fig. 23.

Cypha graeca: The male listed above represents the first record since the original description, which is based on specimens from Levkás, Crete, and the Pelopónnisos (ASSING 2004a).

Drusilla cretica: The original description of this species is based on a male from the Lefka Ori (ASSING 2005b). Subsequent records (ASSING 2008c) and the material listed above are from the Psiloritis range. Females from the Lefka Ori are required to confirm that both populations are indeed conspecific.

Geostiba exsecta: This species has been recorded only from several localities in the Psiloritis range (ASSING 1999, 2007b), where it is probably endemic. However, it is unclear if the distributions of this species and *G. idaea*, another endemic of the same mountain range, are parapatric or overlap.

Geostiba meybohmi: This species is currently known from some localities in or near the Katharo and Lassithi plateaus (ASSING 2000, 2001b) and evidently endemic to the Dikti range. The specimens listed above were collected near the type locality.

Geostiba thryptisensis: The distribution of *G. thryptisensis* is confined to the Orno Thriptis (ASSING 2001b). The specimens listed above represent the first records since the original description.

Oxypoda cretica (Figs. 45–46, 72–73): The original description of *O. cretica* is based on a single male from "Kreta Lassithi, Selia Afhin 1000 m" (ASSING 2006a). The records listed above, the reduced wings, and the discovery of a closely related species (*O. idana* n. sp.) in the Psiloritis range suggest that *O. cretica* is endemic to the Dikti Oros. Numerous specimens were collected in the habitat shown in Figs. 72–73. The median lobe of the aedeagus and the previously unknown spermatheca are illustrated in Figs. 45–46.

Oxypoda subnitida: This species is widespread in the western Mediterranean and was recently also reported from Corfu and Cyprus (ASSING 2012, TRONQUET 2004). The previously known distribution is mapped by ASSING (2012).

Leptobium creticum (Figs. 72–73): Unlike the following species, *L. creticum* is widespread in Crete and subject to a remarkable colour polymorphism (ASSING 2005a). Interestingly, all the specimens from Limnakaro and the Lasithi plateaus (altogether 56 specimens) have the head reddish, whereas in the ten specimens from other localities (including the Katharo plateau), the head is blackish. Numerous specimens were collected in the locality shown in Figs. 72–73.

Leptobium thryptisense: This species is a local endemic of the Orno Thriptis (ASSING 2005a). The three specimens listed above represent the first records since the original description.

Scopaeus muehlei: According to FRISCH (2003), this species was previously known only from "Chania, Kavallos" and from Plakias in the western half of Crete. The two specimens listed above considerably expand the known distribution of this Cretan endemic towards the east of the island.

3.2 Endemic species

Owing to its isolated geographic situation for more than five million years, its size, and its topology (presence of several high mountain ranges separated by deep valleys), the number of endemic Staphylinidae species in Crete is greater than in other eastern Mediterranean islands such as Cyprus and Rhodos. Moreover, the easternmost portion of Crete has been separated from the main body of the island during warm periods with higher sealevels, which would, for instance, account for the presence of a locally endemic species of *Leptobium* Casey, 1905 in the Orno Thriptis.

Including the newly described species, 63 named endemic species and subspecies are now known from Crete, the distribution of *Medon cerrutii* also including the neighbouring island Kárpathos. The taxonomic status of three specific and subspecific names is doubtful; it does not seem unlikely that they may turn out to represent synonyms. Five unnamed endemic species of Scydmaeninae and ten to eleven of Pselaphinae are known from the island, but have not been described (BRACHAT pers. comm., MEYBOHM pers. comm.). One unnamed species of *Amischa* will be described in the context of a more comprehensive study of West Palaearctic *Amischa* Thomson, 1858 (ASSING in prep.).

The endemic Staphylinidae fauna of Crete is composed of taxa of both southern Balkans and southwestern Anatolian affiliations. Several genera are represented in Crete either by only one species (see list chapter 3.1) or by several, but not particularly closely related species (i. e., non-monophyletic assemblages), e. g., *Aloconota minoica* and *A. brachyptera*, *Atheta cretica* and *A. biroi*, *Medon beroni* and *M. cerrutii*, *Xantholinus minos* and *X. creticus*. On the other hand, some species groups of Cretan endemics are evidently monophyletic and are the result of speciation on the island.

The genus with the greatest number of endemic species is *Geostiba* Thomson, 1858, which is represented in Crete

by a total of eight species. One of them, *G. oertzeni* (Eppelsheim, 1888) of the subgenus *Sibiota* Casey, 1906, is widespread in the Balkans (including numerous Mediterranean islands), Turkey, and the Black Sea region (Assing 2006b). The remaining seven species, all of them belonging to the subgenus *Sipalotricha* Scheerpeltz, 1931, are locally endemic in Crete. The three major mountain ranges (Lefka Ori, Psiloritis, Dikti) each host two species, and the Thriptis one. The available evidence suggests that they form a monophylum and that their closest relative may be *G. rhodiensis*, a species distributed in Rhodos and in southwestern Anatolia. This would indicate that speciation occurred on the island.

The genus *Tectusa* is particularly speciose in the southern Balkans. In mainland Greece and particularly in the Pelopónnisos, it is represented by numerous locally endemic, mostly undescribed species. The genus is unknown from Rhodos and from southwestern Anatolia. The species inhabit the higher montane and the alpine zones of mountain ranges and are almost exclusively found near snow. The presence of *Tectusa* in Crete confirms the previously hypothesised zoogeographic relationship with the fauna of the southern Balkans (Assing 2008b). Moreover, the discovery of two additional species in Crete, one them in the Dikti Oros and the other in the Orno Thriptis, suggests that other mountain ranges, too, particularly the Psiloritis range, may host additional *Tectusa* species.

The nominate subgenus of *Myrmecopora* Saulcy, 1864 now comprises eleven species, all of them associated with harvester ants of the genus *Messor* Forel, 1890 and distributed in the eastern Mediterranean from Greece to the Middle East. The diversity is greatest in southern Anatolia (6 species) and Crete (4 species) (Assing 1997). Only one species, *M. pygmaea* (Sachse, 1852), is known from southern Greece. The reason why the subgenus is represented in Crete by so many species is unknown; all of them are fully winged and probably capable of flight. Unfortunately, a revision of Cretan *Messor* species is not available. According to formicidae.org (retrieved on 2.VII.2012), eight species of *Messor* have been recorded from Crete. The Thriptis range may host yet another species of *Myrmecopora*, but so far only one female has become available from there.

Two myrmecophilous species of *Astenus* Dejean, 1833, subgenus *Eurysunius* Reitter, 1909, are now known from Crete, two species have been recorded from mainland Greece and six from Turkey. All of them are associated with ants of the genus *Tetramorium* Mayr, 1855, which, according to formicidae.org (retrieved on 2.VII.2012), is represented in Crete by six species. This figure, however, should be regarded as highly tentative, since most species groups of *Tetramorium* are in need of taxonomic revision and the genus probably includes numerous cryptic, yet undescribed species. One of the two myrmecophilous Cretan *Astenus* species is known from the west (Lefka Ori), the other from the extreme east (Thriptis), suggesting that additional species may be present also in other mountain ranges.

The paederine genus *Sunius* Stephens, 1829 was previously represented in Crete only by one recorded species, *S. fallax* (Lokay, 1919) of the *S. melanocephalus* species group, a species that is widespread from the southeast of Central Europe to Crete and to the south of European Russia (Assing 2008a). In view of the long tradition of entomological research in Crete, the discovery of *S. diktiana* came as quite a surprise. The species belongs to the *S. seminiger* group, which has a circum-Mediterranean distribution and comprises approximately 55 locally endemic species (Assing 2008a, 2011a, 2011b). This species group is particularly speciose in southwestern Anatolia and represented in southern Greece by only two species. Since practically every mountain range with suitable geological conditions (limestone) in southwestern Anatolia hosts its own species of the *S. seminiger* group, the same may be true also of Crete. Therefore, it would not seem unlikely that yet undescribed species are present also in the Psiloritis and Lefka Ori ranges.

The genus *Oxypoda* Mannerheim, 1830 is represented in the Cretan fauna by two endemic species (plus additional widespread taxa), *O. cretica* from the Dikti and *O. idana* from the Psiloritis range. Both species are undoubtedly adelphotaxa, suggesting that speciation has occurred on the island. The nearest relative is currently unknown. It does not seem unlikely that at least the Lefka Ori may host an additional representative of this species group.

The following list gives the named endemic (sub-)species of Crete with the distribution of local endemics and – if necessary – remarks (in square brackets). According to Feldmann (in prep.), *Domene lohseiana* Bordoni, 1977, which is listed as a Cretan endemic in Smetana (2004), is a synonym of a widespread species and omitted in the list.

Boreaphilus fuelscheri Zerche, 1990 – Psiloritis
Boreaphilus meybohmi Assing, 2002 – Lefka Ori
Lesteva longoelytrata cretica Lohse & Steel, 1961 – [doubtful status]
Lesteva brondeeli Lohse & Steel, 1961
Lesteva nitidicollis Lohse & Steel, 1961
Lesteva szekessyi Lohse & Steel, 1961
Amauronyx paganettii W. Blattný & C. Blattný, 1916
Batrisodes paganettii W. Blattný & C. Blattný, 1916
Brachygluta gnosiaca Besuchet, 2004
Claviger oertzeni Reitter, 1885
Tychus creticus Reitter, 1885
Tychus lagrecai Sabella, 2002 – Psiloritis
Tychus reitterianus Löbl, 1998
Alevonota cretica Assing & Wunderle, 2008
Aloconota brachyptera n. sp. – Dikti Oros, Psiloritis
Aloconota minoica Pace, 2002
Atheta biroi Scheerpeltz, 1964

Atheta cretica Brundin, 1944
Dinusa cretica n. sp.
Drusilla cretica Assing, 2005 – Lefka Ori
Geostiba albimontis Assing, 2007 – Lefka Ori
Geostiba diktiana n. sp. – Dikti Oros
Geostiba exsecta Assing, 1999 – Psiloritis
Geostiba icaria Pace, 1996 – Lefka Ori
Geostiba idaea Pace, 1996 – Psiloritis
Geostiba meybohmi Assing, 2000 – Dikti Oros
Geostiba thryptisensis Assing, 2001 – Orno Thriptis
Myrmecopora elisa Assing, 1997 – Dikti Oros
Myrmecopora fornicata Assing, 1997 – "Crete"
Myrmecopora idana n. sp. – Psiloritis
Myrmecopora plana Assing, 1997 – Lefka Ori
Ocalea cretica Coiffait, 1976
Oxypoda cretica Assing, 2006 – Dikti Oros
Oxypoda idana n. sp. – Psiloritis
Phytosus holtzi Bernhauer, 1935
Pronomaea wunderlei Assing, 2007
Tectusa callicera Assing, 2002 – Lefka Ori
Tectusa diktiana n. sp. – Dikti Oros
Tectusa thriptica n. sp. – Orno Thriptis
Stenus ariadne Puthz, 1977
Eutheia paganettii Franz, 1971
Scydmoraphes fuelscheri Meybohm, 2008
Scydmoraphes minotauri Meybohm, 2008
Scydmoraphes ziegleri Meybohm, 2008
Stenichnus basimpressus W. Blattný & C. Blattný, 1916
Stenichnus creticus W. Blattný & C. Blattný, 1916
Stenichnus hummleri W. Blattný & C. Blattný, 1916
Astenus minos Assing, 2003 – Lefka Ori
Astenus thripticus n. sp. – Orno Thriptis
Leptobium creticum Coiffait, 1973
Leptobium thryptisense Assing, 2005 – Orno Thriptis
Lobrathium candicum Bordoni, 2009
Medon beroni Coiffait, 1970
Medon cerrutii Coiffait, 1976 – [also in Kárpathos]
Pseudolathra cretensis Bordoni, 1986 – [doubtful status]
Scopaeus creticus Frisch, 1994
Scopaeus muehlei Frisch, 1994
Sunius diktianus n. sp. – Dikti Oros
Quedius candicus Coiffait, 1976
Quedius fulgidus creticus Mařan, 1935 – [doubtful status]
Quedius sigwalti Coiffait, 1972
Xantholinus creticus Assing, 2008
Xantholinus minos Assing, 2008

3.3 Descriptions of new species
3.3.1 Aleocharinae
3.3.1.1 Falagriini

Myrmecopora (Myrmecopora) idana **n. sp.**
(Figs. 1–6)

Type material

Holotype ♂ [with three workers of *Messor* sp. attached to the pin]: "GR – Crete [33], S Anogia, Psiloritis, 35°15'59"N, 24°53'57"E, 1090 m, under stones, 5.IV.2012, V. Assing / Holotypus ♂ *Myrmecopora idana* n. sp. det. V. Assing 2012" (cAss).

Etymology

The specific epithet (adjective) is derived from Ida, a synonym of Psiloritis, the mountain range where the type locality is situated.

Description

Body length 4.0 mm; length of forebody 1.7 mm. Habitus as in Fig. 1. Coloration: head dark-brown; pronotum and elytra brown; abdomen blackish-brown, with the anterior segments and the apex slightly paler; legs yellowish-brown; antennae dark-reddish, with antennomeres I–II yellowish-red.

Head (Fig. 2) strongly transverse and wedge-shaped; punctation moderately dense and very fine; interstices with shallow microsculpture. Eyes approximately as long as postocular region in dorsal view. Antenna (Fig. 3) approximately 1.5 mm long; antennomere III approximately twice as long as broad, longer than II; IV–X approximately 1.5 times as long as broad and of subequal length; XI slender, slightly longer than the combined length of IX and X.

Pronotum (Fig. 2) 1.25 times as broad as long and 1.1 times as broad as head; punctation dense, fine, but distinct.

Elytra (Fig. 2) approximately 0.9 times as long as pronotum; posterior margin sinuate near postero-lateral angles; punctation fine and dense. Hind wings fully developed. Legs very long and slender; metatarsus almost as long as metatibia; metatarsomere approximately as long as the combined length of II–IV.

Abdomen narrower than elytra; punctation fine, but distinct, somewhat denser on anterior than on posterior tergites; interstices glossy; posterior margin of tergite VII with palisade fringe.

♂: almost all of dorsal surface of head distinctly and extensively impressed (Figs. 1–2); pronotum with pronounced and extensive median impression (Figs. 1–2); posterior margins of tergite VIII and sternite VIII broadly convex; median lobe of aedeagus 0.54 mm long; ventral process rather broad basally and weakly incised apically in ventral view (Figs. 4–6).

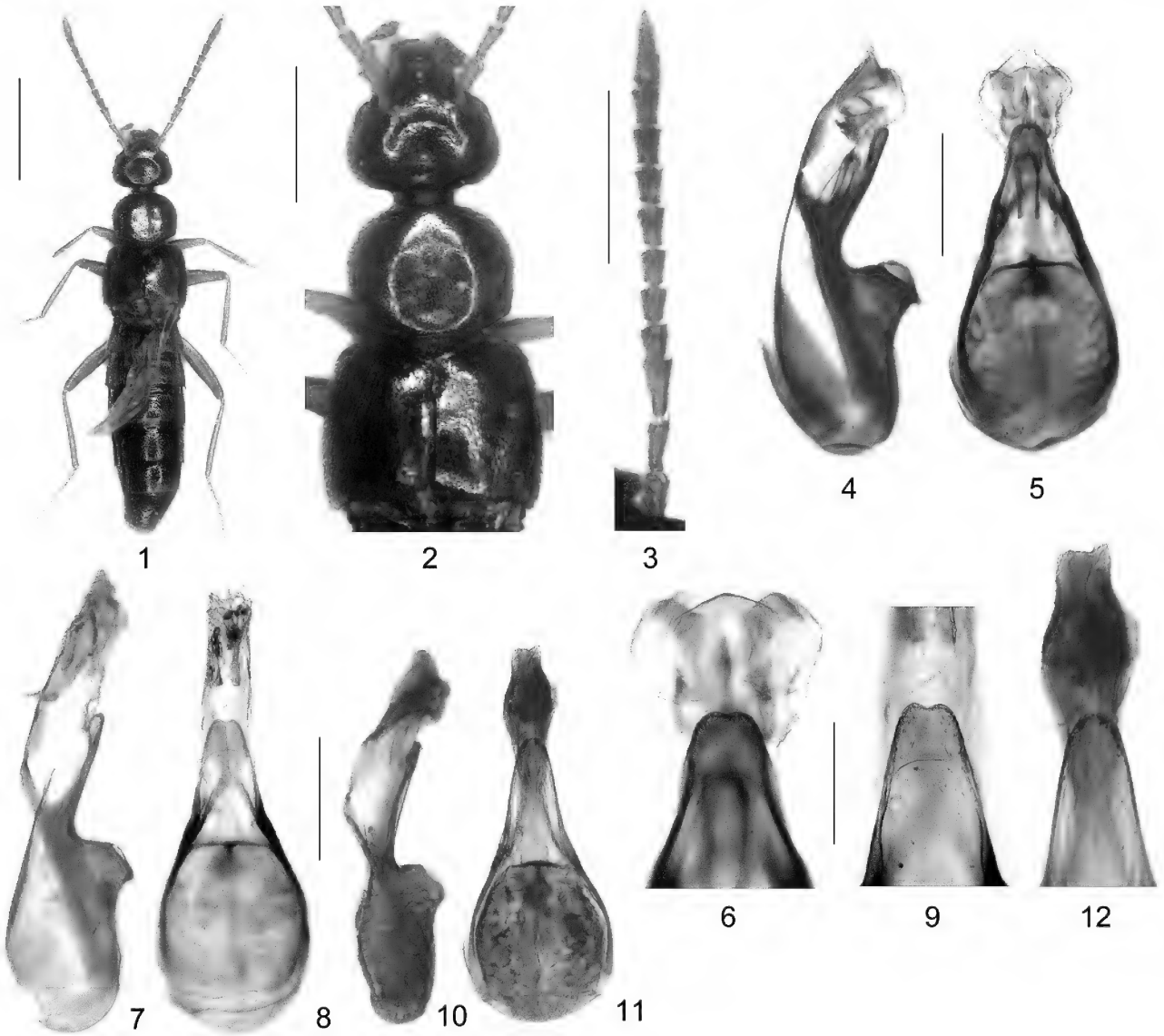
♀: unknown.

Comparative notes

The new species is distinguished from the three previously known Cretan representatives of the subgenus *Myrmecopora* as follows:

from *M. elisa* (Dikti range) by the slightly more slender habitus, the more even impression on the male head, and by the completely different shape of the ventral process of the aedeagus (particularly in ventral view);

from *M. fornicata* (exact locality unknown) by the much more distinct and extensive impressions on the male head and pronotum, the less slender antennomere IV, and



Figs. 1–12. *Myrmecopora idana* (1–6), *M. plana*, holotype (7–9), and *M. fornicata*, holotype (10–12). – **1**. Habitus. **2**. Forebody. **3**. Antenna. **4–5**, **7–8**, **10–11**. Median lobe of aedeagus in lateral and in ventral view. **6**, **9**, **12**. Apical portion of ventral process of aedeagus in ventral view. – Scale bars: 1.0 mm (1), 0.5 mm (2–3), 0.2 mm (4–5, 7–8, 10–11), 0.1 mm (6, 9, 12).

by the shape of the ventral process of the aedeagus (*M. fornicata*: much more slender and apically not excised in ventral view);

from *M. plana* (Lefka Ori) by the less slender antennae (*M. plana*: antennomeres IV–X almost twice as long as broad), the more pronounced and more extensive impressions on the male head and pronotum, and by the shape of the ventral process of the aedeagus (*M. plana*: ventral process slightly shorter, basally narrower in ventral view; "angle" between ventral process and crista apicalis more obtuse in lateral view; crista apicalis less pronounced).

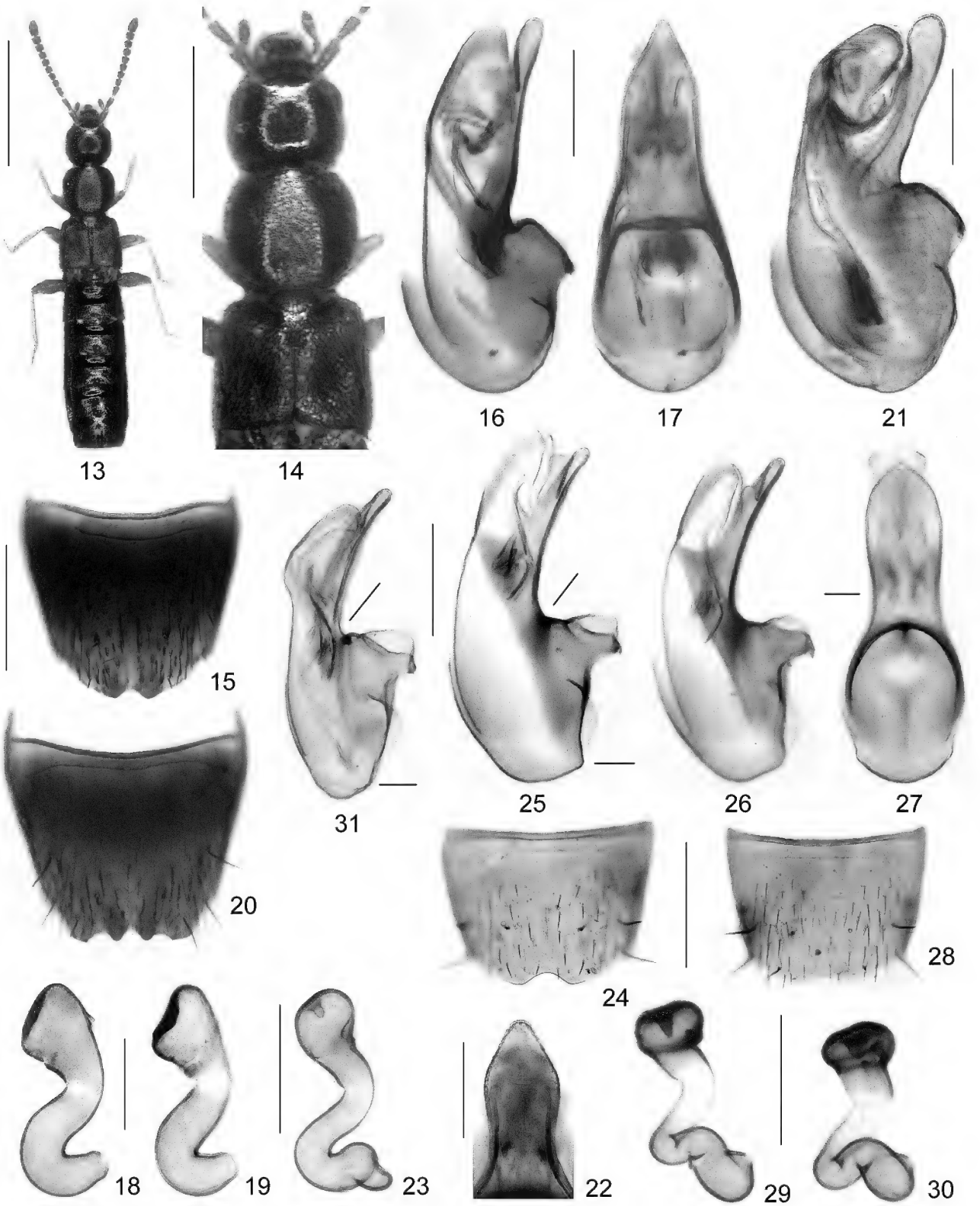
For illustrations of the sexual characters of *M. elisa*, *M. fornicata*, and *M. plana* see Assing (1997) and Figs. 7–12.

Distribution and natural history

The type locality is situated in the Psiloritis range at an altitude of nearly 1100 m. The holotype was collected from a nest of *Messor* sp. in a rocky pasture.

3.3.1.2 Geostibini

Together with several other genera previously attributed to the Athetini, *Aloconota* Thomson, 1858 and *Geostiba* Thomson, 1958 were recently placed in the tribe Geostibini (Elven et al. 2012).



Figs. 13–31. *Aloconota brachyptera* (13–19), *A. minoica* (20–23), *Geostiba diktiana* (24–30), and *G. meybohmi* (31). – **13**. Habitus. **14**. Forebody. **15**, **20**, **24**. Male tergite VIII. **16–17**, **21**, **25–27**, **31**. Median lobe of aedeagus in lateral and in ventral view. **18–19**, **23**, **29–30**. Spermatheca. **22**. Apical portion of ventral process of aedeagus in ventral view. **28**. Female tergite VIII. – Scale bars: 1.0 mm (13), 0.5 mm (14), 0.2 mm (15, 20, 24, 28), 0.1 mm (16–19, 21–23, 25–27, 29–31).

Aloconota (Aloconota) brachyptera **n. sp.**
(Figs. 13–19, 56, 72–73)

Type material

Holotype ♂: "GR – Crete [10a], NW Dikti Oros, Limnakaro, 35°08'08"N, 25°29'00"E, 1170 m, sifted, 26.III.2012, V. Assing / Holotypus ♂ *Aloconota brachyptera* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 1 ♂: same data as holotype, but "[10] … under stones" (cAss); 1 ♀: same data as holotype, but "[11a] … 27.III.2012" (cAss); 1 ♂: same data as holotype, but "[17a] … 30.III.2012" (cAss); 2 ♀♀: same data as holotype, but "[17] … under stones, 30.III.2012" (cAss); 1 ♂: same data as holotype, but "[38] … *Messor* nests, 7.IV.2012" (cAss); 1 ♂: "GR – Crete [12], NW Dikti Oros, Limnakaro, 35°08'16"N, 25°28'52"E, 1140 m, under stones, 28.III.2012, V. Assing" (cAss); 1 ♀: same data, but "[16] … 30.III.2012" (cAss); 2 ♂♂, 1 ♀: "GR – Crete [25], S Anogia, Psiloritis, 35°15'41"N, 24°53'16"E, 1150 m, under stones, 2.IV.2012, V. Assing" (cAss); 1 ♂, 1 ♀: "GR – Crete [28], S Anogia, Psiloritis, 35°14'59"N, 24°53'95"E, 1180 m, under stones, 3.IV.2012, V. Assing" (cAss).

Etymology

The specific epithet (Greek adjective) refers to the short elytra and hind wings.

Description

Body length 2.8–3.4 mm; length of forebody 1.2–1.4 mm. Habitus as in Fig. 13. Coloration: head blackish-brown; pronotum brown to blackish-brown; elytra reddish-brown, with weak bronze hue; abdomen blackish-brown; legs dark-yellowish to yellowish-brown; antennae dark-brown, with antennomeres I and II slightly paler.

Head (Fig. 14) weakly transverse, 1.05–1.10 times as broad as long; punctation moderately dense and extremely fine, barely noticeable in the distinct microreticulation; genal carinae not distinctly visible in lateral view. Eyes as long as, or slightly longer than postocular region in dorsal view. Antennae slender; antennomeres I–III distinctly oblong; III slightly shorter than II; IV approximately as long as broad; V–X of gradually increasing width and increasingly transverse; X approximately 1.5 times as broad as long.

Pronotum (Fig. 14) 1.05–1.10 times as broad as long and 1.10–1.15 times as broad as head; punctation extremely fine, barely visible in the pronounced microreticulation; pubescence depressed and fine, directed laterad in lateral portions, caudad in anterior $\frac{4}{5}$–$\frac{5}{6}$ of midline and cephalad in the posterior $\frac{1}{6}$–$\frac{1}{3}$ of pronotum.

Elytra short, 0.75–0.85 times as long as pronotum (Fig. 14); disc often with more or less extensive impression; surface practically matt due to the pronounced microsculpture; punctation fine and indistinctly granulose. Hind wings of reduced length, less than twice as long as elytra. Metatarsomere I slightly shorter than the combined length of II and III.

Abdomen approximately as broad as elytra; punctation fine and moderately dense; microsculpture shallow on anterior tergites, distinct on posterior tergites; posterior margin of tergite VII with palisade fringe; tergites VII and VIII with sexual dimorphism.

♂: tergite VII posteriorly with oblong median tubercle; tergite VIII with granules, posterior margin excised in the middle (Fig. 15); sternite VIII with strongly convex posterior margin (Fig. 56); aedeagus shaped as in Figs. 16–17.

♀: tergite VIII finely punctate and without posterior excision; sternite VIII with broadly convex posterior margin; spermatheca as in Figs. 18–19.

Comparative notes

The new species is distinguished from other West Palaearctic *Aloconota* species by the short elytra and hind wings, the modifications of the male tergite VIII, and by the shape of the aedeagus and the spermatheca. Based on the morphology of the primary sexual characters, *A. brachyptera* is closely related to the widespread and common *A. gregaria* (Erichson, 1839), from which it is additionally separated by the modified male tergite VII and by the pubescence pattern of the pronotum.

Distribution and natural history

As can be inferred from the reduced elytra and hind wings, *A. brachyptera* is most likely endemic to Crete. Since it was found in both the Dikti and the Psiloritis ranges, it may be more widespread in the island. The specimens were collected on slopes with shrubs and scattered trees, as well as in a pasture by turning stones and sifting grass roots and leaf litter, mostly near snow, at altitudes of 1140–1180 m (Figs. 72–73). One specimen was sifted from a *Messor* nest.

Geostiba (Sipalotricha) diktiana **n. sp.**
(Figs. 24–30, 72–73)

Type material

Holotype ♂: "GR – Crete [11a], NW Dikti Oros, Limnakaro, 35°08'08"N, 25°29'00"E, 1170 m, sifted, 27.III.2012, V. Assing / Holotypus ♂ *Geostiba diktiana* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 30 ♂♂, 13 ♀♀: same data as holotype; 1 ♂, 1 ♀: same data as holotype, but "[11a] … under stones"; 50 ♂♂, 36 ♀♀: same data as holotype, but "[17a] … 30.III.2012"; 3 ♂♂, 3 ♀♀: "GR – Crete [12], NW Dikti Oros, Limnakaro, 35°08'16"N, 25°28'52"E, 1140 m, under stones, 28.III.2012, V. Assing"; 42 ♂♂, 33 ♀♀: same data, but "[12a]"; 1 ♂, 1 ♀: same data, but "[16] … 30.III.2012". – Paratypes in MNHUB, cAss, cFel, cSch, cWun.

Etymology

The specific epithet (adjective) is derived from the name of the mountain range where the species is probably endemic.

Description

Body length 2.5–3.0 mm; length of forebody 1.1–1.2 mm.

External characters as in other Cretan species of the subgenus *Sipalotricha*. Distinguished only by the primary and secondary sexual characters.

♂: posterior margin of tergite VIII excised in the middle (Fig. 24); sternite VIII posteriorly convex; median lobe of aedeagus approximately 0.3 mm long and shaped as in Figs. 25–27, with a pair of minute semi-transparent spines basally.

♀: posterior margin of tergite VIII weakly concave in the middle (Fig. 28); posterior margin of sternite VIII broadly convex and with row of stout marginal setae; spermatheca as in Figs. 29–30.

Comparative notes

Six locally endemic species of *Sipalotricha* were previously known from Crete. The only other representative of the subgenus in the Dikti range is *Geostiba meybohmi*, which was originally described based on material from the Katharo plateau (Assing 2000), subsequently reported from the Lassithi plateau and the environs of Selakano (Assing 2001b), and recorded from the Katharo plateau again in 2012 (chapter 3.1). The new species is distinguished from *G. meybohmi* by the deeper posterior excision of the male tergite VIII, the basally angular median lobe of the aedeagus (lateral view; see line in Fig. 25), the straight outline between the crista apicalis and the base of the ventral process in lateral view (*G. meybohmi*: angular; see line in Fig. 31), the basally somewhat narrowed ventral process (ventral view; see line in Fig. 27), the presence of only two indistinct short spines in the internal sac (*G. meybohmi*: more numerous longer and more distinct spines), and by the more strongly dilated distal portion of the spermathecal capsule. For a key separating the previously known *Sipalotricha* species from Crete see Assing (2009), for illustrations of the sexual characters of these species see Assing (1999, 2000, 2001b, 2007b), Pace (1996), and Fig. 31.

Distribution and natural history

The species is currently known only from one valley to the northwest of the Dikti Oros, where numerous specimens were collected from under stones and sifted from grass roots, leaf litter, and moss, mostly near snow, at altitudes of 1140–1170 m (Figs. 72–73). *Aloconota brachyptera*, *Dinusa cretica*, *Sunius diktianus*, and other endemic species were collected in the same locality. One specimen was infested with *Monoicomyces homalotae* (Laboulbeniales; det. W. Rossi).

3.3.1.3 Oxypodini

Dinusa cretica **n. sp.**
(Figs. 32–35, 72–73)

Type material

Holotype ♂ [with three workers of *Messor* sp. attached to the pin]: "GR – Crete [11], NW Dikti Oros, Limnakaro, 35°08'08"N, 25°29'00"E, 1170 m, under stones, 27.III.2012, V. Assing / Holotypus ♂ *Dinusa cretica* sp. n. det. V. Assing 2012" (cAss).

Paratype ♀ [with three specimens of *Messor* sp. attached to the pin]: same data as holotype, but "[11c] … *Messor* nest, 28.III.2012" (cAss).

Etymology

The specific epithet (adjective) denotes that the species is probably endemic to Crete.

Description

Body length 4.7–5.0 mm; length of forebody 2.3 mm. Habitus as in Fig. 32. Coloration: head blackish-brown; pronotum dark-brown in the middle, lateral margins broadly, anterior and posterior margins narrowly pale-reddish; elytra reddish, scutellar region and lateral portions slightly darker; abdomen blackish-brown, with segments VIII–X and posterior third of segment VII yellowish-red; legs and antennae pale-reddish.

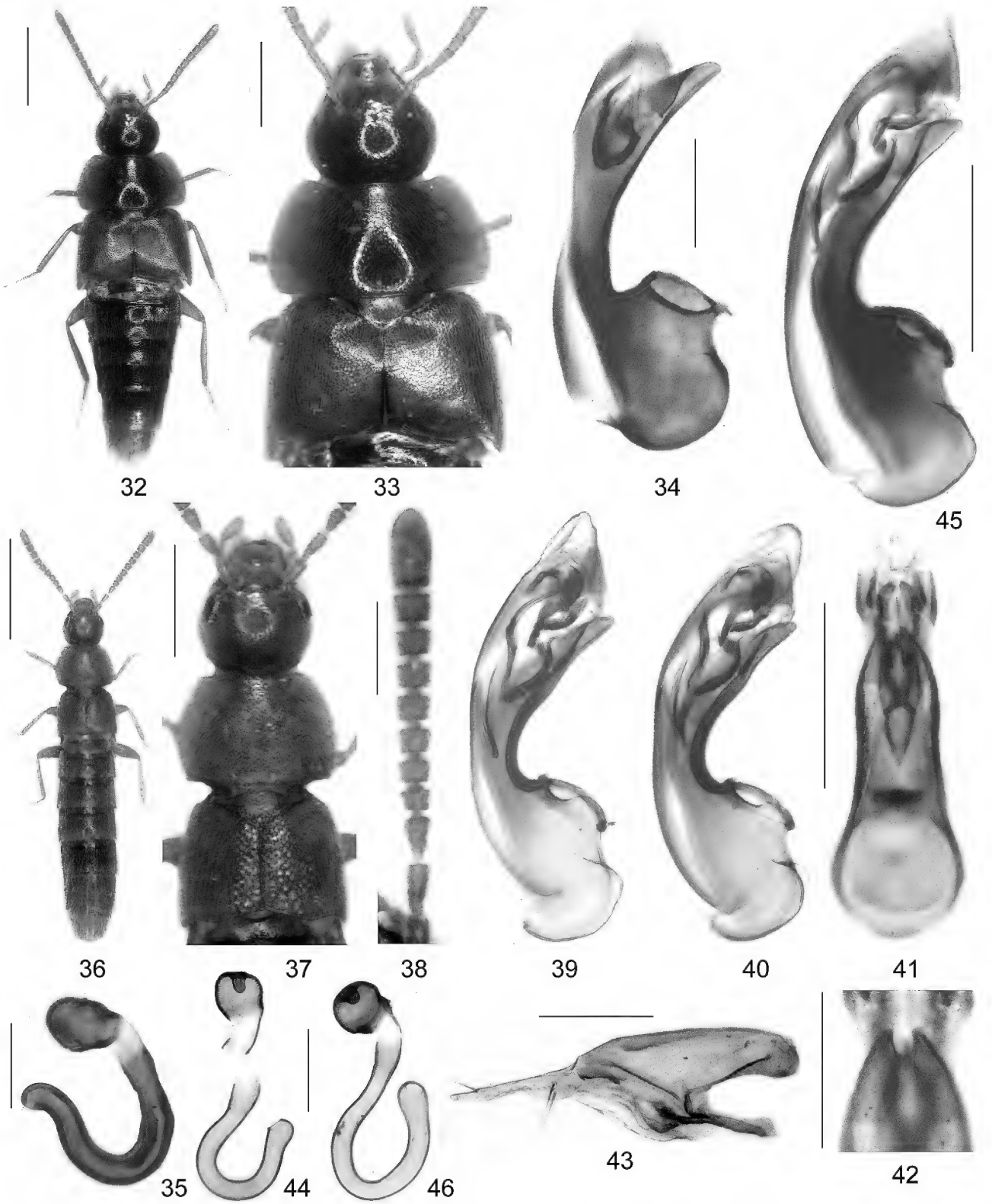
Head (Fig. 33) strongly transverse, wedge-shaped; punctation sparse and very fine; interstices only with traces of microsculpture. Eyes weakly convex, not projecting from lateral contours of head, approximately as long as postocular region in dorsal view. Antenna approximately 1.5 mm long and somewhat depressed; antennomeres I–III distinctly oblong; III distinctly longer than II; IV oblong and shorter than III; XI somewhat longer than the combined length of IX and X.

Pronotum (Fig. 33) strongly transverse, 1.85–1.95 times as broad as long and 1.6–1.7 times as broad as head; posterior angles broadly rounded; posterior margin weakly bisinuate; punctation sparse and fine, but much more distinct than that of head; interstices only with indistinct traces of microsculpture.

Elytra approximately 0.9 times as long as pronotum (Fig. 33), somewhat dilated posteriorly; posterior margin distinctly sinuate near postero-lateral angle; punctation dense, fine, and distinct; interstices without appreciable microsculpture. Hind wings apparently fully developed. Metatarsomere I slightly longer than combined length of II–IV.

Abdomen distinctly wedge-shaped; punctation fine, but distinct, rather dense on tergites III–VI and somewhat sparser on tergites VII–VIII; posterior margin of tergite VII with palisade fringe; tergites VIII–X with long black setae.

♂: posterior margin of tergite VIII pointed in the middle; sternite VIII posteriorly produced and acutely pointed;



Figs. 32–46. *Dinusa cretica* (32–35), *Oxypoda idana* (36–44), and *O. cretica* (45–46). – **32**, **36**. Habitus. **33**, **37**. Forebody. **34**, **39–40**, **45**. Median lobe of aedeagus in lateral view. **35**, **44**, **46**. Spermatheca. **38**. Antenna. **41**. Median lobe of aedeagus in ventral view. **42**. Apical portion of ventral process of aedeagus in ventral view. **43**. Paramere. – Scale bars: 1.0 mm (32, 36), 0.5 mm (33, 37), 0.2 mm (34, 38–41, 43, 45), 0.1 mm (35, 42, 44, 46).

median lobe of aedeagus 0.72 mm long and shaped as in Fig. 34.

♀: posterior margin of sternite VIII weakly concave in the middle; spermatheca as in Fig. 35.

Comparative notes

The oxypodine genus *Dinusa* Saulcy, 1865 is distributed in the southern West Palaearctic region and previously comprised ten species, all of them extremely rare and rather similar in external characters. The currently available evidence suggests that they are associated with harvester ants (*Messor* spp.). The geographically closest species are *D. taygetana* Eppelsheim, 1880 from the Pelopónnisos, *D. smyrnensis* Assing, 2007 from western Anatolia, and *D. taurica* Assing, 2001. The new species is distinguished from *D. smyrnensis* by the much shorter duct of the spermatheca, from *D. taurica* by the less slender median lobe of the aedeagus and the differently shaped spermatheca, and from *D. taygetana* (type material examined), whose male sexual characters are unknown, by the less distinct punctation of the pronotum, the more transverse pronotum, and the differently shaped spermatheca. For illustrations of *D. smyrnensis* and *D. taurica* see Assing (2001a, 2007c).

Distribution and natural history

The type locality is situated in the Dikti mountain range. Both specimens were collected from the same nest of *Messor* sp. on two consecutive days. Several days later one second-instar and one third-instar larvae probably belonging to this species were found in the nest, which was situated at the foot of an east slope at an altitude of 1170 m (Figs. 72–73) and which hosted also a specimen of *Myrmecopora elisa*.

Oxypoda (Bessopora) idana **n. sp.**
(Figs. 36–44)

Type material

Holotype ♂: "GR – Crete [28], S Anogia, Psiloritis, 35°14'59"N, 24°53'05"E, 1180 m, under stones, 3.IV.2012, V. Assing / Holotypus ♂ *Oxypoda idana* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 1 ♂ [without elytra; one antenna missing]: same data as holotype, but "[28a] … sifted" (cAss); 1 ♀: "GR – Crete [25], S Anogia, Psiloritis, 35°15'41"N, 24°53'16"E, 1150 m, under stones, 2.IV.2012, V. Assing" (cAss).

Etymology

The specific epithet (adjective) is derived from Ida, a synonym of Psiloritis, the mountain range where the species is probably endemic.

Description

Body length 3.1–3.5 mm; length of forebody 1.2–1.4 mm. Habitus as in Fig. 36. Coloration: whole body reddish, only median portion of tergite VI blackish.

Head (Fig. 37) approximately 1.1 times as broad as long; punctation dense, shallow, and moderately fine; interstices with shallow microsculpture. Eyes of moderate size, approximately as long as postocular region in dorsal view. Antenna (Fig. 38) rather massive and approximately 1 mm long; antennomeres IV–X moderately transverse and of gradually increasing width; XI massive and almost as long as the combined length of VIII–X. Preapical palpomere of maxillary palpus approximately twice as long as broad.

Pronotum (Fig. 37) 1.35–1.40 times as broad as long and approximately 1.4 times as broad as head, widest approximately in the middle; posterior angles obtusely marked; punctation very dense, fine, and somewhat asperate.

Elytra short, approximately 0.7 times as long as pronotum (Fig. 37); surface somewhat more glossy than that of pronotum; punctation dense and fine, but less so than that of pronotum. Hind wings completely reduced. Metatarsus long and slender, almost as long as metatibia; metatarsomere I approximately as long as the combined length of II–IV.

Abdomen approximately as broad as elytra, with relatively long and mostly depressed yellowish pubescence; punctation moderately dense, very fine on anterior and moderately fine on posterior tergites; interstices without microsculpture and glossy; posterior margin of tergite VII without palisade fringe.

♂: posterior margin of sternite VIII strongly, convexly produced in the middle; median lobe of aedeagus approximately 0.35 mm long, shaped as in Figs. 39–41; apex of ventral process distinctly excised in ventral view (Fig. 42); apical lobe of paramere very long (Fig. 43).

♀: posterior margin of sternite VIII weakly convex; spermatheca as in Fig. 44.

Comparative notes

Oxypoda idana is undoubtedly most closely related to *O. cretica* from the Dikti range, as can be inferred from the similar external and sexual characters. It is distinguished from that species by the somewhat smaller and more slender body, less transverse antennomeres IV–X, the less densely punctate abdomen, the distinctly smaller and differently shaped median lobe of the aedeagus, and by the smaller and differently shaped spermatheca. For illustrations of *O. cretica* see Assing (2006a) and Figs. 45–46.

Distribution and natural history

The reduced wings and palisade fringe of the abdominal tergite VII, as well as the evidently restricted distribu-

tion of the closely related *O. cretica* suggest that *O. idana* is endemic to the Psiloritis range. The type specimens were found near snow, under stones and by sifting leaf litter and grass roots, in a pasture and on slopes with shrubs and scattered trees at altitudes of 1150 and 1180 m.

Tectusa diktiana **n. sp.**
(Figs. 47–52)

Type material

Holotype ♂: "GR – Crete [39a], NW Dikti Oros, S Limnakaro, 35°07'33"N, 25°29'00"E, 1330 m, N-slope, sifted, 7.IV.2012, V. Assing / Holotypus ♂ *Tectusa diktiana* sp. n. det. V. Assing 2012" (cAss).

Paratype ♀: same data as holotype (cAss).

Etymology

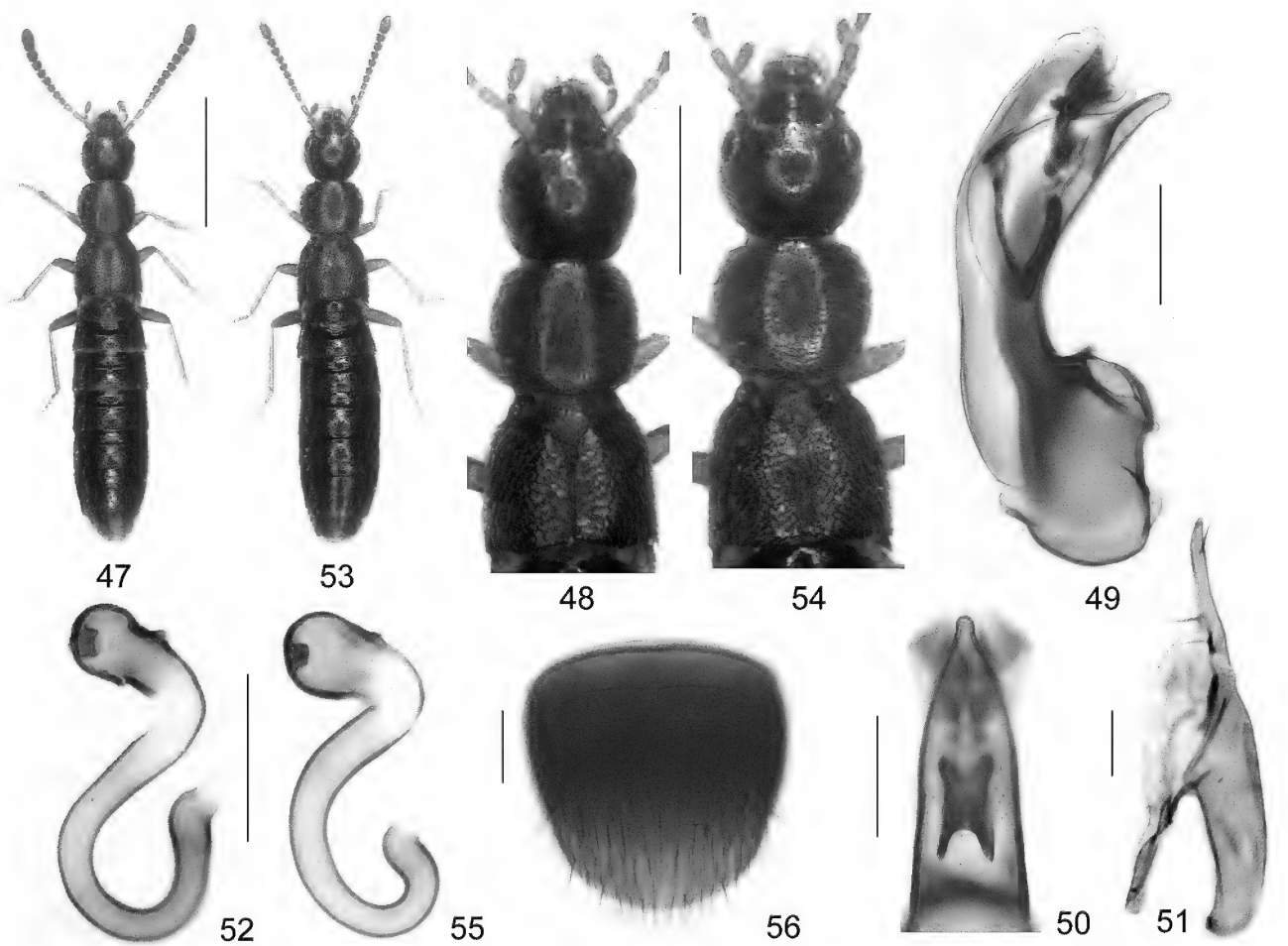
The specific epithet (adjective) is derived from the Dikti Oros, the mountain range where the species is probably endemic.

Description

Body length 3.5–3.7 mm; length of forebody 1.4–1.5 mm. Habitus as in Fig. 47. Coloration: head blackish-brown; pronotum and elytra dark-brown to blackish-brown; abdomen blackish; legs pale-reddish to yellowish-brown; antennae dark-brown with yellowish base (antennomeres I–III or I–IV).

Head (Fig. 48) approximately as broad as long; punctation fine, shallow, moderately dense, sparser in median dorsal portion, barely noticeable in the microreticulations. Eyes weakly convex, shorter than postocular region in dorsal view. Antenna approximately 1 mm long; antennomere IV approximately as long as broad; V–X of increasing width and increasingly transverse; X less than twice as broad as long; XI longer than the combined length of IX and X.

Pronotum (Fig. 48) slender, approximately 1.1 times as broad as long and 1.05–1.10 times as broad as head, widest near anterior angles, and distinctly tapering caudad; punc-



Figs. 47–56. *Tectusa diktiana* (47–52), *T. thriptica* (53–55), and *Aloconota brachyptera* (56). – **47**, **53**. Habitus. **48**, **54**. Forebody. **49**. Median lobe of aedeagus in lateral view. **50**. Ventral process of aedeagus in ventral view. **51**. Paramere. **52**, **55**. Spermatheca. **56**. Male sternite VIII. – Scale bars: 1.0 mm (47, 53), 0.5 mm (48, 54), 0.1 mm (49–52, 55–56).

tation dense and fine, but more distinct than that of head; interstices with distinct microsculpture.

Elytra short, 0.65–0.70 times as long as pronotum (Fig. 48); punctation dense and weakly granulose; interstices with distinct microreticulation and practically matt. Hind wings completely reduced. Metatarsomere I slightly longer than the combined length of II and III.

Abdomen broader than elytra, broadest at the posterior margin of segment VI; tergites III–VI with anterior impressions, that of tergite VI noticeably shallower than those of tergites III–V; punctation fine and moderately dense; interstices with microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII distinctly convex.

♂: posterior margin of sternite VIII strongly convex; median lobe of aedeagus 0.40 mm long, shaped as in Fig. 49; apex of ventral process pointed in ventral view (Fig. 50); apical lobe of paramere very long (Fig. 51).

♀: posterior margin of sternite VIII indistinctly concave in the middle; spermatheca as in Fig. 52.

Comparative notes

From *T. callicera*, the only previously known *Tectusa* species from Crete, *T. diktiana* is distinguished by the different coloration and shape of the antennae (*T. callicera*: apically not distinctly infuscate and more massive), the less distinct punctation of the pronotum, the shorter elytra (*T. callicera*: 0.75–0.80 times as long as pronotum), the paler coloration of the legs (*T. callicera*: at least femora brown), the shorter metatarsomere I (*T. callicera*: almost as long as combined length of II–IV), the more densely punctured and more distinctly microsculptured abdomen, the different morphology of the median lobe of the aedeagus, the very weakly convex and in the middle indistinctly concave posterior margin of the female sternite VIII (*T. callicera*: distinctly convex, not concave in the middle), and the different shape of the spermatheca. For illustrations of *T. callicera* see Assing (2002).

Distribution and natural history

As can be inferred from the adaptive reductions of the wings and the palisade fringe of the abdominal tergite VII, as well as from the restricted distributions of other *Tectusa* species from the southern Balkans, *T. diktiana* is probably endemic to the Dikti range. The type locality is situated to the south of the Lasithi plateau and of Limnakaro, close to the trail leading to the summit of the Dikti Oros. The specimens were sifted from shrub litter and moss near snowfields on a north slope at an altitude of 1330 m.

Tectusa thriptica **n. sp.**

(Figs. 53–55)

Type material

Holotype ♀: "GR – Crete [3], Thriptis Mt., SE Thripti, 1270 m, 35°04'56"N, 25°52'45"E, sifted near snowfield, 25.III.2012, V. Assing / Holotypus ♀ *Tectusa thriptica* sp. n. det. V. Assing 2012" (cAss).

Etymology

The specific epithet (adjective) is derived from Orno Thriptis, the name of the mountain range where the species is probably endemic.

Description

Body length 3.5 mm; length of forebody 1.5 mm. Habitus as in Fig. 53. Coloration: forebody blackish-brown; abdomen blackish; legs dark-yellowish; antennae dark-brown with dark-yellowish antennomeres I–III.

Head (Fig. 54) approximately as broad as long; punctation fine, shallow, moderately dense, slightly less dense in median dorsal portion, barely noticeable in the microreticulation. Eyes weakly convex, shorter than postocular region in dorsal view. Antenna approximately 1 mm long; antennomere IV approximately as long as broad; V–X of increasing width and increasingly transverse; X less than twice as broad as long; XI longer than the combined length of IX and X.

Pronotum (Fig. 54) slender, 1.12 times as broad as long and 1.12 times as broad as head, widest near anterior angles, and distinctly tapering caudad; punctation dense and fine, but more distinct than that of head; interstices with distinct microsculpture.

Elytra short, 0.7 times as long as pronotum (Fig. 54); punctation dense and weakly granulose; interstices with distinct microreticulation and practically matt. Hind wings completely reduced. Metatarsomere I almost as long as the combined length of II–IV.

Abdomen broader than elytra, broadest at the posterior margin of segment VI; tergites III–VI with anterior impressions, that of tergite VI noticeably shallower than those of tergites III–V; punctation fine and moderately dense; interstices with microreticulation; posterior margin of tergite VII without palisade fringe; posterior margin of tergite VIII distinctly convex.

♂: unknown.

♀: posterior margin of sternite VIII convex; spermatheca as in Fig. 55.

Comparative notes

Tectusa thriptica is distinguished from *T. diktiana* by the anteriorly slightly broader pronotum, the somewhat finer antennae, the longer metatarsomere I, the more distinctly convex posterior margin of the female sternite

VIII, and by the different shape of the spermatheca. It is separated from *T. callicera* by the much finer and apically infuscate antennae, the finer punctation of the pronotum, the shorter elytra (*T. callicera*: 0.75–0.80 times as long as pronotum), the paler coloration of the legs (*T. callicera*: at least femora brown), the more densely punctured and more distinctly microsculptured abdomen, and the different shape of the spermatheca. For illustrations of *T. callicera* see Assing (2002).

Distribution and natural history

Tectusa thriptica is probably endemic to the Triptis range in eastern Crete. The holotype was found at the margin of a plateau by sifting oak litter and grass roots near a small snowfield at an altitude of 1270 m.

3.3.2 Paederinae

Astenus (Eurysunius) thripticus **n. sp.**
(Figs. 57–61)

Type material

Holotype ♂ [with five workers of a pale-coloured (forebody dark-yellowish; abdomen dark-brown) *Tetramorium* sp. attached to the pin]: "GR – Crete [34], Orno Thriptis, E Thripti, 35°05'35"N, 25°52'36"E, 970 m, under stones, 6.IV.2012, V. Assing / Holotypus ♂ *Astenus thripticus* sp. n. det. V. Assing 2012" (cAss).

Paratype ♂ [with five workers of *Tetramorium* sp. attached to the pin]: same data as holotype (cAss).

Etymology

The specific epithet (adjective) is derived from Orno Thriptis, the name of the mountain range where the type locality is situated.

Description

Body length 4.4–4.8 mm; length of forebody 2.0–2.1 mm. Habitus as in Fig. 57. Coloration: head reddish-brown; pronotum reddish; elytra yellowish; abdomen dark-brown with reddish apex; legs yellowish; antennae yellowish-red.

Head (Fig. 58) approximately 1.25 times as broad as long; punctation very dense and shallowly umbilicate, rather weakly defined; interstices reduced to narrow ridges; dorsal surface almost matt. Eyes as long as, or slightly longer than postocular region in dorsal view. Antennae (Fig. 59) short, approximately 1 mm long; antennomere III approximately twice as long as broad and distinctly longer than II; IV much shorter than III and weakly transverse; V–X transverse; XI shorter than the combined length of IX and X.

Pronotum (Fig. 58) of transversely rectangular shape, approximately 1.1 times as broad as long and 0.9 times as broad as head; lateral margins straight or indistinctly concave in dorsal view; punctation shallow, relatively fine, and not umbilicate; interstices glossy; disc without distinct impressions, except for a very shallow impression in posterior median portion; anterior and posterior angles each with one long seta of approximately ⅔ the length of lateral margins.

Elytra slightly broader than, and approximately 0.6 times as long as pronotum (Fig. 58); punctation somewhat granulose; interstices without microsculpture; pubescence short, pale, and depressed. Hind wings reduced. Metatarsomere I slightly shorter than combined length of II–IV.

Abdomen approximately as broad as elytra; punctation distinct, dense on anterior and somewhat less dense on posterior tergites; tergite VII without palisade fringe.

♂: sternite VII with short and basally acute posterior excision; aedeagus 0.63 mm long, shaped as in Figs. 60–61.

Comparative notes

In external characters, *A. thripticus* is highly similar to *A. minos* from western Crete, the only other myrmecophilous species of the subgenus *Eurysunius* previously recorded from Crete. Both species are reliably distinguished only based on the shape of the apex of the ventral process of the aedeagus. For illustrations of the aedeagus of *A. minos* see Figs. 62–63.

Distribution and natural history

The type locality is situated in the Orno Thriptis in the extreme east of Crete. The two type specimens were found in a nest of *Tetramorium* sp. under a stone on a moist meadow at an altitude of 970 m.

Sunius diktianus **n. sp.**
(Figs. 64–73)

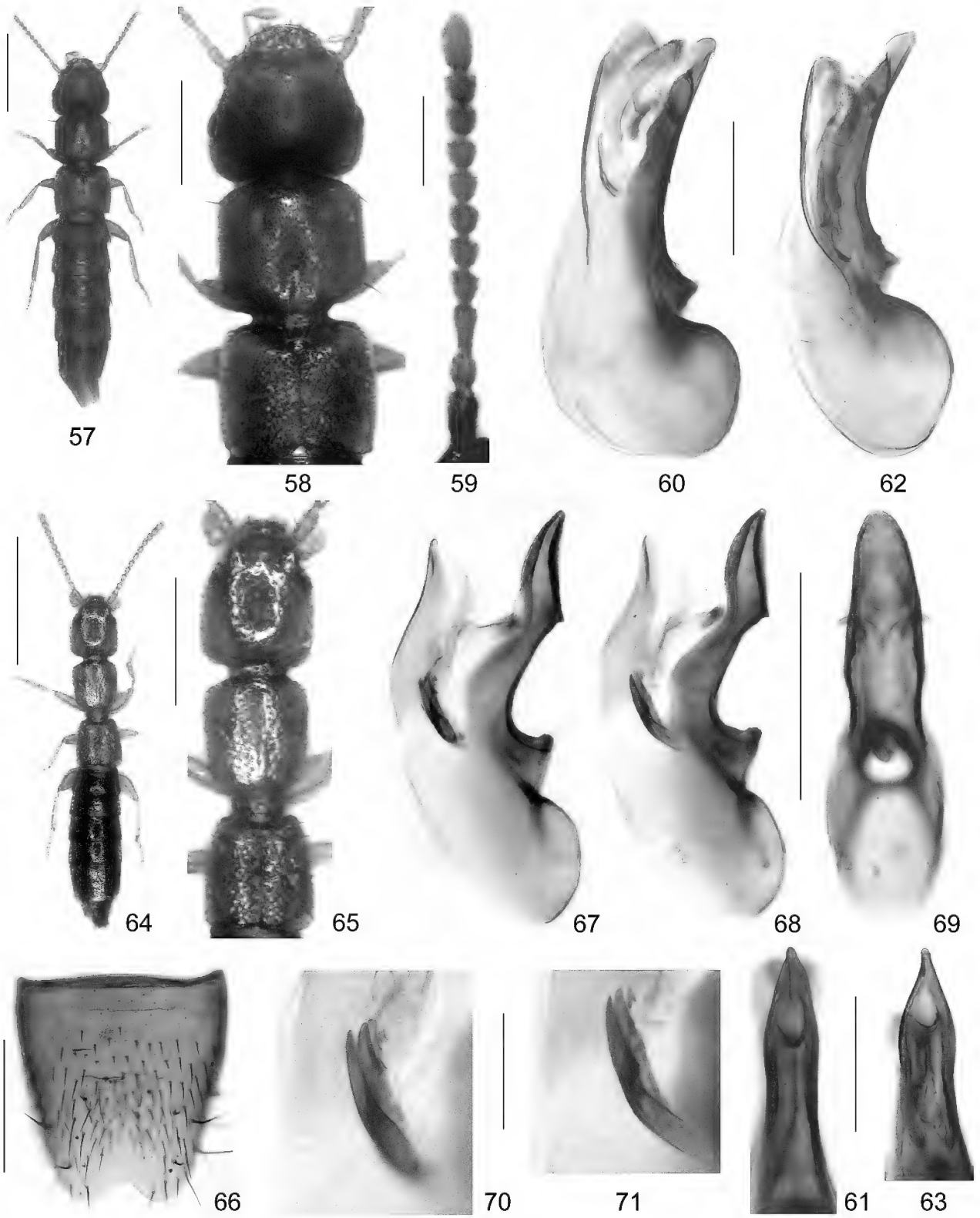
Type material

Holotype ♂: "GR – Crete [10], NW Dikti Oros, Limnakaro, 35°08'08"N, 25°29'00"E, 1170 m, under stones, 26.III.2012, V. Assing / Holotypus ♂ *Sunius diktianus* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 3 ♂♂, 11 ♀♀: same data as holotype; 4 ♂♂, 3 ♀♀: same data as holotype, but "[11] … 27.III.2012"; 2 ♂♂, 2 ♀♀: same data as holotype, but "[11a] … sifted, 27.III.2012"; 7 ♀♀: same data as holotype, but "[17] … 30.III.2012"; 1 ♀: same data as holotype, but "[17a] … sifted, 30.III.2012"; 19 ♂♂, 39 ♀♀: "GR – Crete [12], NW Dikti Oros, Limnakaro, 35°08'16"N, 25°28'52"E, 1140 m, under stones, 28.III.2012, V. Assing"; 4 ♂♂, 7 ♀♀: same data, but "[16] … 30.III.2012". – Paratypes in cAss, cFel, and MNHUB.

Etymology

The specific epithet (adjective) is derived from Dikti Oros, the mountain range where the type locality is situated.



Figs. 57–71. *Astenus thripticus* (57–61), *A. minos*, holotype (62–63), and *Sunius diktianus* (64–71; 67, 70: holotype). – **57**, **64**. Habitus. **58**, **65**. Forebody. **59**. Antenna. **60**, **62**, **67–68**. Aedeagus in lateral view. **61**, **63**. Ventral process of aedeagus in ventral view. **66**. Male sternite VIII. **69**. Aedeagus in ventral view. **70–71**. Internal structures of aedeagus in lateral view. – Scale bars: 1.0 mm (57, 64), 0.5 mm (58, 65), 0.1 mm (59–63, 66–69), 0.05 mm (70–71).

Figs. 72-73. Sample plots in Crete, 2012. – **72**. Limnakaro plateau (sample numbers 23–36) to the northwest of the Dikti Oros (to be seen in the background). **73**. Slope S Limnakaro (sample numbers 24–28; four new species were collected in this locality).

Description

Body length 2.5–3.1 mm; length of forebody 1.3–1.4 mm. Habitus as in Fig. 64. Coloration: forebody yellowish-red; abdomen blackish-brown to blackish with slightly paler apex; legs and antennae yellowish.

Head (Fig. 65) weakly oblong; punctation coarse and rather sparse. Eyes small, not distinctly protruding from lateral contours of head, less than one third as long as postocular region.

Pronotum (Fig. 65) approximately 1.1 times as long as broad and 0.90–0.95 times as broad as head; punctation similar to that of head, but denser.

Elytra short, approximately 0.75 times as long as pronotum (Fig. 65); punctation rather irregular and ill-defined. Hind wings completely reduced.

Abdomen somewhat broader than elytra; punctation moderately dense and fine; interstices with shallow microsculpture; posterior margin of tergite VII without palisade fringe.

♂: sternite VII unmodified; sternite VIII with indistinct median elevation with diagonal pubescence, posterior excision small and basally rounded (Fig. 66); aedeagus 0.36–0.38 mm long, shaped as in Figs. 67–69; internal sac with series of a few sclerotised spines of different lengths (Figs. 70–71).

Comparative notes

As can be inferred from the external and particularly from the male sexual characters, *S. diktianus* belongs to the *S. seminiger* group, which comprises numerous micropterous and locally endemic species distributed in the Mediterranean (Assing 2008a). The species of the *S. seminiger* group are reliably distinguished only by the male sexual characters. The aedeagus and the male sternite VII of *S. diktianus* somewhat resemble those of *S. menalonicus* Assing, 2008 from the Pelopónnisos, but the apical portion of the ventral process is distinctly shorter, the internal spines of the aedeagus are much longer and more sclerotised, and the posterior excision of the male sternite VIII is smaller. For illustrations of *S. menalonicus* see Assing (2008a), for a recent key to the *Sunius* species of the Palaearctic region see Assing (2011a). The only other named *Sunius* species known from Crete is *S. fallax*, which is much larger (length of forebody at least approximately 2 mm), usually has a blackish head and extensively infuscate elytra, distinctly longer elytra, either fully developed or less strongly reduced hind wings, a palisade fringe at the posterior margin of the male tergite VII, and completely different male sexual characters.

Distribution and natural history

Sunius diktianus is probably endemic to the Dikti Oros. In all, 103 specimens were found in two adjacent localities to the south of Limnakaro at an altitude of 1140–1170 m, but not in other nearby localities, although the area was investigated for several days, suggesting that the distribution of *S. diktianus* may be patchy and local. Two additional females of the *S. seminiger* group were found in the Katharo plateau and at the Bramanon reservoir near Ierapetra, the latter at an unusually low altitude (70 m). Whether or not these females are conspecific with *S. diktianus* is uncertain and can be clarified only based on males from these localities.

Most of the type specimens were collected from under stones in grassy patches near snowfields (Figs. 72–73), some were sifted from shrub litter and grass roots near snow.

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On the Staphylinidae (Coleoptera) of Turkey IX. Five new species, a new synonymy, and additional records

Volker Assing

Abstract

A study of more than 3,700 specimens of Staphylinidae collected during three field trips to Turkey conducted in 2011 and 2012, as well as of additional material received from other sources yielded nearly 290 species. Five species are described and illustrated: *Atheta (Philhygra) scabens* **n. sp.** (NE-Turkey, N-Caucasus, Kyrgyzstan, Tajikistan); *Atheta brachati* **n. sp.** (Turkey: Bolu); *Cousya microdotoides* **n. sp.** (Turkey: Adana); *Meotica wunderlei* **n. sp.** (Turkey: Isparta); *Stenus (Hemistenus) bithynicus* **n. sp.** (Turkey: Kocaeli, Sakarya, Düzce). One synonymy is proposed: *Leptusa asiatica* Bernhauer, 1909 = *L. flagellulifera* Assing, 2009, **n. syn.** Ten species are recorded from Turkey for the first time; two new country records are reported for Greece and Iraq. The distributions of seven species are mapped. A recently published catalogue of the Staphylinidae of Asia Minor and Cyprus is reviewed. Most of the names synonymised in this catalogue are revalidated; the remaining synonymies are rectified.

Keywords: Coleoptera, Staphylinidae, Turkey, Greece, Iraq, new species, new synonymy, revalidation, endemism, additional records, zoogeography, taxonomy, catalogue, review.

Zusammenfassung

Die Bearbeitung von mehr als 3700 Staphyliniden, die auf drei in den Jahren 2011 und 2012 in die Türkei unternommenen Exkursionen gesammelt wurden, sowie von weiterem Material, ergab insgesamt fast 290 Arten. Fünf Arten werden beschrieben und abgebildet: *Atheta (Philhygra) scabens* **n. sp.** (Nordosttürkei, Kirgisistan, Tadschikistan); *Atheta brachati* **n. sp.** (Türkei: Bolu); *Cousya microdotoides* **n. sp.** (Türkei: Adana); *Meotica wunderlei* **n. sp.** (Türkei: Isparta); *Stenus (Hemistenus) bithynicus* **n. sp.** (Türkei: Kocaeli, Sakarya, Düzce). *Leptusa flagellulifera* Assing, 2009, **n. syn.**, wird mit *L. asiatica* Bernhauer, 1909 synonymisiert. Zehn Arten werden erstmals aus der Türkei, je eine Art erstmals aus Griechenland bzw. dem Irak nachgewiesen. Die Verbreitungsgebiete von sieben Arten werden anhand von Karten illustriert. Ein kürzlich erschienener Katalog der Staphyliniden von Kleinasien und Zypern wird rezensiert. Fast alle in diesem Katalog synonymisierten Namen werden revalidiert; die restlichen Synonymien werden korrigiert.

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1 Introduction

The present paper is the ninth contribution to the Turkish staphylinid fauna providing descriptions and records of species from miscellaneous subfamilies and genera. Since the latest instalment (Assing 2011a), additional material has become available primarily from two field trips to central southern and to northwestern Turkey conducted by Volker Brachat (Geretsried) and Heinrich Meybohm (Großhansdorf) in April 2011 and in April/May 2012, respectively, as well as one to southwestern Turkey conducted by Paul Wunderle (Mönchengladbach) and the author in April 2011. Moreover, additional material was seen from several public and private collections. An examination of this material, in total nearly 290 species and approximately 3,700 specimens, yielded not only numerous

records of zoogeographic interest, among them ten new country records from Turkish territory, but also five species new to science.

Most of the material of genera such as *Sunius* Stephens, 1829, *Pella* Stephens, 1836, and *Geostiba* Thomson, 1858 has been, or will be, treated in separate revisionary contributions covering the West Palaearctic or the whole of the Palaearctic region (Assing 2011b, 2011c, in prep.). As in previous contributions, the Scaphidiinae, Pselaphinae, and Scydmaeninae are not treated in the present paper; the latter two have been, or will be, studied by Volker Brachat and Heinrich Meybohm, respectively.

In the recent past, a checklist (Anlaş 2009) and a catalogue (Bordoni 2010) of the Staphylinidae of Turkey were published. The former has been commented on explicitly or implicitly in earlier contributions (e. g., Assing 2011a). The latter became available only after the previous contribution (Assing 2011a) had been submitted and will be dealt with in section 4 of the present paper.

Acknowledgements

I am indebted to Volker Brachat, Geretsried, and Heinrich Meybohm, Großhansdorf, for the generous gift of their staphylinid by-catches collected during their field trips to Turkey. The following colleagues assisted with the identification of certain species or genera: Johannes Frisch, Berlin (*Scopaeus* spp.), Mikhail Gildenkhov, Smolensk (*Carpelimus atomus*), Michael Schülke, Berlin (*Mycetoporus glaber*, *Tachyporus assingi*, *T. solutus*), and Adriano Zanetti, Verona (*Dropephylla* spp., *Dialycera aspera*, *Eusphalerum caucasicum loebli*, *Omalium turcicum*). The criticism and comments of two reviewers, Benedikt Feldmann, Münster, and Michael Schülke, Berlin, are appreciated. Volker Puthz, Schlitz, Adriano Zanetti, and Alexey Solodovnikov, Copenhagen, reviewed – and approved of – the comments on the catalogue by Bordoni (2010). Volker Puthz additionally confirmed the novelty of *Stenus bithynicus*.

2 Material and methods

The material studied in the present paper is deposited in the following public and private collections:

cAnl	private collection Sinan Anlaş, Turgutlu
cAss	author's private collection
cFel	private collection Benedikt Feldmann, Münster
cSch	private collection Michael Schülke, Berlin
cVav	private collection Jiří Vávra, Ostrava-Krásné Pole
cWun	private collection Paul Wunderle, Mönchengladbach
BMNH	The Natural History Museum, London (R. Booth)
EME	Entomology Museum, Erzurum (E. Yildirim)
MNHUB	Museum für Naturkunde der Humboldt-Universität, Berlin (J. Frisch)
NHMW	Naturhistorisches Museum Wien (H. Schillhammer)
NMP	National Museum of Natural History, Praha (J. Hájek)

The morphological studies were conducted using a Stemi SV 11 microscope (Zeiss Germany) and a Jenalab compound microscope (Carl Zeiss Jena). A digital camera (Nikon Coolpix 995) was used for the photographs. The maps were created using MapCreator 2.0 (primap) software.

Head length was measured from the anterior margin of the clypeus (Aleocharinae) or from the anterior margin of the frons (Steninae) to the posterior margin of the head, elytral length at the suture from the apex of the scutellum to the posterior margin of the elytra, total length from the anterior margin of the mandibles (in resting position) to the apex of the abdomen, the length of the forebody from the anterior margin of the mandibles to the posterior margin of the elytra, and the length of the aedeagus from the apex of the ventral process to the base of the aedeagal capsule. The side of the aedeagus with the sperm duct opening is referred to as the ventral, the opposite side as the dorsal aspect.

The individual labels of type specimens are separated by slashes; they are cited in the original spelling and format, except that the following adaptations were made according to the general format requirements of the journal: names of persons (except authors of species) in small capitals, scientific names of genera and species in italics.

3 Results

3.1 General results

The field trips conducted in spring 2011 and in spring 2012 yielded a total of approximately 3,700 Staphylinidae (exclusive of Scaphidiinae, Pselaphinae, and Scydmaeninae) belonging to more than 275 species. The material seen from other sources comprised 56 specimens and yielded eleven additional species (see list below). The vast majority of specimens was identified to species level. Some, however, remain of doubtful identity either because they were represented only by females (e. g., *Mycetoporus nigricollis* group, *Astenus* spp., *Quedius* spp., *Gabrius* spp., *Xantholinus* spp.) or because they belong to species groups or genera that are currently in a state of taxonomic confusion and require revision (e. g., *Olophrum* sp., *Mycetoporus baudueri* group, *Sepedophilus* spp., *Anaulacaspis* spp., *Atheta* (*Microdota*) spp., *Atheta* (*Mocyta*) spp., *Cousya* spp., *Ocalea* spp., *Oxypoda* (*Baeoglena*) spp.).

The examined material not only included numerous new province records (not listed individually), new country records of ten species and the first primary record of an additional species from Turkey (see section 3.2), but also several species new to science. Some of them have already been described in the context of revisionary studies (Assing 2011b, 2011c, 2012) or in other separate articles (Schülke 2013). The remainder is described in section 3.3. Two new country records are reported for Greece and Iraq.

A complete list of Staphylinidae (exclusive of Scaphidiinae, Pselaphinae, and Scydmaeninae) recorded from Turkey in 2011 and 2012 (sample numbers 1–95) and examined from other sources (sample numbers 96–130) is given below. In the localities column, the number of specimens is

given in parentheses behind the respective locality number. The chronological order of the subfamilies is arranged according to SMETANA (2004). The genera and species within the subfamilies are arranged in alphabetical order.

Localities and collection data corresponding to the sample numbers of the list below are as follows:

Staphylinidae collected in 2011–2012 (deposited in MNHUB, cAss, cFel, and cWun) (sample numbers 1–95):

Kocaeli (1–9; leg. BRACHAT & MEYBOHM): **1**: Kartepe, 40°39'N, 30°04'E, 1030 m, 24.IV.2012; **2**: Kartepe, 40°39'N, 30°05'E, 1040 m, 24.IV.2012; **3**: Suadiye, 40°41'N, 30°03'E, 180 m, 25.IV.2012; **4**: Suadiye, 40°40'N, 30°03'E, 540 m, 25.IV.2012; **5**: Pazarçayiri, 40°38'N, 30°04'E, 720 m, 25.IV.2012; **6**: same data, but 5.V.2012; **7**: Pazarçayiri, 40°39'N, 30°03'E, 880 m, 25.IV.2012; **8**: Kartepe, 40°39'N, 30°06'E, 1270 m, 5.V.2012; **9**: N Hereke, 40°49'N, 29°41'E, 460 m, 6.V.2012.

Sakarya (10–17; leg. BRACHAT & MEYBOHM): **10**: Geyve-Taraklı, 40°26'N, 30°24'E, 700 m, 26.IV.2012; **11**: Geyve-Taraklı, 40°26'N, 30°26'E, 710 m, 26.IV.2012; **12**: Geyve-Taraklı, 40°27'N, 30°28'E, 775 m, 26.IV.2012; **13**: 17 km N Hendek, 40°53'N, 30°46'E, 650 m, 3.V.2012; **14**: 14 km N Hendek, 40°54'N, 30°45'E, 700 m, 3.V.2012; **15**: 4 km S Dikmen, 40°40'N, 30°54'E, 1275 m, 4.V.2012; **16**: 2 km W Dikmen, 40°42'N, 30°53'E, 700 m, 4.V.2012; **17**: 14 km W Dikmen, 40°44'N, 30°50'E, 430 m, 4.V.2012.

Bolu (18–31; leg. BRACHAT & MEYBOHM): **18**: 20 km W Mudurnu, 40°31'N, 31°05'E, 620 m, 26.IV.2012; **19**: S Abant, 40°34'N, 31°16'E, 1010 m, 27.IV.2012; **20**: S Abant, 40°35'N, 31°16'E, 1180 m, 27.IV.2012; **21**: Abant, 40°36'N, 31°17'E, 1400 m, 27.IV.2012; **22**: 8 km NE Abant, 40°39'N, 31°22'E, 1010 m, 27.IV.2012; **23**: Yedigöller Milli Park, 40°53'N, 31°41'E, 1720 m, 28.IV.2012; **24**: Yedigöller Milli Park, 40°50'N, 31°40'E, 1120 m, 28.IV.2012; **25**: Yığılca, 40°51'N, 31°39'E, 1060 m, 29.IV.2012; **26**: Bolu-Yığılca, 40°51'N, 31°37'E, 1010 m, 29.IV.2012; **27**: Bolu-Yığılca, 40°51'N, 31°37'E, 980 m, 29.IV.2012; **28**: 25 km S Bolu, 40°38'N, 31°37'E, 1580 m, 30.IV.2012; **29**: 23 km S Bolu, 40°38'N, 31°37'E, 1540 m, 30.IV.2012; **30**: 11 km S Bolu, 40°40'N, 31°38'E, 1080 m, 30.IV.2012; **31**: 10 km S Bolu, 40°40'N, 31°38'E, 1020 m, 30.IV.2012.

Düzce (32–36; leg. BRACHAT & MEYBOHM): **32**: 26 km S Düzce, 40°41'N, 31°09'E, 1200 m, 1.V.2012; **33**: 23 km S Düzce, 40°41'N, 31°08'E, 1020 m, 1.V.2012; **34**: 19 km S Düzce, 40°42'N, 31°10'E, 650 m, 1.V.2012; **35**: Kaplandede Dağı, 40°57'N, 31°04'E, 1100 m, 2.V.2012; **36**: Kaplandede Dağı, 40°55'N, 31°02'E, 710 m, 2.V.2012.

Afyon (37–41; leg. ASSING & WUNDERLE): **37**: Emir Dağları, 20 km S Emirdağ, 38°55'N, 31°07'E, 1170 m, pasture, under stones, 18.IV.2011; **38**: Emir Dağları, 20 km S Emirdağ, 38°53'N, 31°09'E, 1450 m, pasture, under stones, 18.IV.2011; **39**: Emir Dağları, 20 km S Emirdağ, 38°54'N, 31°08'E, 1230 m, N-slope with oak, sifted, 18.IV.2011; **40**: Sultan Dağları, 15 km SE Çay, 38°32'N, 31°11'E, 1430 m, oak forest, litter and bark sifted, 18.IV.2011; **41**: Sultan Dağları, 15 km SE Çay, 38°31'N, 31°09'E, 1810 m, cedar forest, sifted, 18.IV.2011.

Konya (42–53; leg. ASSING & WUNDERLE): **42**: 5 km W Yunak, Bayatkolu Tepe, 38°49'N, 31°41'E, 1420 m, pasture, 17.IV.2011; **43**: 38 km SE Akşehir, 20 km N Hüyük, 38°04'N, 31°39'E, 1440 m, calcareous pasture, under stones, 19.IV.2011; **44**: 39 km SE Akşehir, NW Kayabeli geçidi, 38°02'N, 31°35'E, 1870 m, peak region, under stones, 19.IV.2011; **45**: same data, but sifted, 20.IV.2011; **46**: 25 km N Beyşehir, Selki, 37°54'N, 31°44'E, 1320 m, moist calcareous road margin, under stones, 19.IV.2011; **47**: 30 km W Konya, S Kızılören, 37°51'N, 32°06'E, 1390 m, moist road margin, 19.IV.2011; **49**: 35 km ENE Beyşehir, E Hüyük, 37°57'N, 31°38'E, 1290 m, road margin, under stones, 20.IV.2011; **50**: 35 km ENE Beyşehir, E Hüyük, 37°57'N, 31°38'E, 1270 m, near reservoir, under stones, 20.IV.2011; **51**: 15 km NE Hüyük, Konakkale, 38°00'N, 31°41'E, 1490 m, field margin, under stones, 20.IV.2011; **52**: 20 km NE Hüyük, N Konakkale, 38°02'N, 31°40'E, 1520 m, near stream, litter and dead wood (*Salix*) sifted, 20.IV.2011; **53**: Sultan Dağları, NW Dereçine, 38°29'N, 31°15'E, 1320 m, oak forest, litter sifted, 21.IV.2011.

Isparta (54–70; leg. ASSING & WUNDERLE): **54**: Sultan Dağları, 15 km SSW Akşehir, Cankurtaran, 38°15'N, 31°24'E, 1860 m, under stones, 17.IV.2011; **55**: same data, but 22.IV.2011; **56**: 15 km SW Eğirdir, Davraz Tepe, 37°47'N, 30°45'E, 1680 m, stony calcareous slope, under stones, 23.IV.2011; **57**: same data, but 28.IV.2011; **58**: 5 km SW Eğirdir, Davraz Tepe, 37°47'N, 30°45'E, 1780 m, stony calcareous slope, under stones, 23.IV.2011; **59**: 15 km SW Eğirdir, Davraz Tepe, 37°47'N, 30°45'E, 1800 m, calcareous slope, pine litter sifted, 23.IV.2011; **60**: 24 km N Eğirdir, Barla Dağı, 38°05'N, 30°46'E, 1720 m, calcareous slope, under stones, 24.IV.2011; **61**: Barla Dağı, 38°06'N, 30°47'E, 1620 m, calcareous pasture, under stones, 24.IV.2011; **62**: Barla Dağı, 38°06'N, 30°47'E, 1680 m, litter and fungi under cedar sifted, 24.IV.2011; **63**: same data, but bark of dead pine sifted; **64**: Barla Dağı, 38°06'N, 30°48'E, 1590 m, calcareous slope, grass roots beneath juniper sifted, 24.IV.2011; **65**: 40 km ESE Eğirdir, Dedegöl Dağları, 8 km W Yenişarbademli, 37°44'N, 30°16'E, 1680 m, pasture, under stones, 25.IV.2011; **66**: 43 km ESE Eğirdir, Dedegöl Dağları, 5 km W Yenişarbademli, 37°43'N, 31°19'E, 1820 m, flooded pasture and calcareous slope, under stones, 25.IV.2011; **67**: 10 km SE Sütçüler, 37°25'N, 31°02'E, 1520 m, moist meadow, under stones, 26.IV.2011; **68**: same data, but grass and moss sifted; **69**: 10 km SE Sütçüler, 37°25'N, 31°02'E, 1520 m, calcareous slope, under stones, 26.IV.2011; **70**: 12 km N Sütçüler, 37°36'N, 30°59'E, 1100 m, oak forest, litter and grass, mostly between stones, sifted, 26.IV.2011.

Niğde (71–73; leg. BRACHAT & MEYBOHM): **71**: E Madenköy, 37°29'N, 34°42'E, 1200 m, 17.IV.2011; **72**: E Madenköy, 37°28'N, 34°40'E, 1330 m, 17.IV.2011; **73**: E Madenköy, 37°27'N, 34°39'E, 1615–1870 m, 17.IV.2011.

Mersin (74–75; leg. BRACHAT & MEYBOHM): **74**: E Çamlıyayla, Belcinar, 37°08'N, 34°42'E, 930 m, 25.IV.2011; **75**: E Çamlıyayla, Darıpınarı, 37°09'N, 34°43'E, 710 m, 25.IV.2011.

Adana (76–95; leg. BRACHAT & MEYBOHM): **76**: Belemedik, 37°23'N, 34°55'E, 720 m, 15.IV.2011; **77**: Belemedik, 37°21'N, 34°55'E, 710 m, 15.IV.2011; **78**: Belemedik, 37°20'N, 34°55'E, 690 m, 16.IV.2011; **79**: E Pozanti, road to Armutoluğu, 37°26'N, 34°54'E, 1220 m, 16.IV.2011; **80**: E Pozanti, road to Armutoluğu, 37°26'N, 34°55'E, 1310 m, 16.IV.2011; **81**: E Pozanti, road to Armutoluğu, 37°26'N, 34°56'E, 1700 m, 16.IV.2011; **82**: Belemedik, 37°21'N, 34°54'E, 740 m, 16.IV.2011; **83**: Kamışlı, 37°32'N, 34°54'E, 1400 m, 18.IV.2011; **84**: Kamışlı, 37°35'N, 34°53'E, 1350 m, 18.IV.2011; **85**: SW Hasandede geçidi, 37°30'N, 35°23'E, 1230 m, 19.IV.2011; **86**: 8 km S Feke, Akkaya, 37°46'N, 35°54'E, 760 m, 21.IV.2011; **87**: 11 km NE Feke, Cumhurlu, 37°53'N, 36°00'E, 710 m, 21.IV.2011; **88**: 14 km NE Feke, Cumhurlu, 37°54'N, 36°00'E, 720 m, 21.IV.2011; **89**: Feke, 21 km to Mansurlu, 37°51'N, 35°46'E, 965 m, 22.IV.2011; **90**: SW Aladağ, SW Kayadibi, 37°28'N, 35°21'E, 1080 m, with *Camponotus* sp.,

23.IV.2011; **91**: 3 km W Karaysali, 37°14'N, 35°01'E, 170 m, 24.IV.2011; **92**: 7 km E Kamışlı, 37°32'N, 35°00'E, 1330 m, 26.IV.2011; **93**: 5 km E Kamışlı, 37°32'N, 34°59'E, 1450 m, 26.IV.2011; **94**: 4 km E Kamışlı, 37°33'N, 34°59'E, 1385 m, 26.IV.2011; **95**: Belemedik, 37°22'N, 34°55'E, 715 m, 27.IV.2011.

Material examined from other sources (sample numbers 96–130):

96: Antalya, 10 km N Akseki, 37°09'N, 31°48'E, 1250 m, mixed cypress and oak forest, litter sifted, 17.II.2011, leg. Schülke (cSch, cAss); **97**: Antalya, 10 km N Akseki, 37°08'N, 31°48'E, 1200 m, oak litter sifted, 14.II.2011, leg. Schülke (cSch, cAss); **98**: 8 km NNW Akseki, 37°07'N, 31°46'E, 1225 m, pine and fir litter sifted, 14.II.2011, leg. Schülke (cSch); **99**: Antalya, 10 km N Akseki, 37°09'N, 31°48'E, 1250 m, cypress and oak forest, litter sifted, 17.II.2011, leg. Schülke (cSch, cAss); **100**: 5 km S Ibradı, 37°04'N, 31°38'E, 810 m, oak litter and dead branches sifted, 17.II.2011, leg. Schülke (cSch); **101**: Antalya, N Bademli geçidi, 37°19'N, 31°44'E, 1400 m, mixed cypress and fir forest, litter sifted, 17.II.2011, leg. Schülke (cSch, cAss); **102**: 40 km SW Antalya, Göynük, 16.–20.IV.2004, leg. Hula (NMP, cAss); **103**: Antalya, Kumluca, 8.V.1998 (EME); **104**: Antalya, 40 km SW Antalya, Göynük, 16.–20.IV.2004, leg. Hula (NMP); **105**: Burdur, 21 km SE Burdur, W Çeltikçi geçidi, 37°34'N, 30°24'E, 1420 m, cypress and oak litter sifted, 16.II.2011, leg. Schülke (cSch); **106**: Muğla, N Fethiye, Çaliş, 36°40'N, 29°06'E, 10 m, bank of stream, 1.X.2002, leg. Assing (cAss); **107**: Muğla, NW Fethiye, Kargi, 36°43'N, 29°36'E, 10 m, gravel river bank, 31.III.2002, leg. Assing (cAss); **108**: Muğla, Çetibeli, 36°58'N, 28°17'E, 10–30 m, floodplain forest, 30.IV.2001, leg. Brachat & Meybohm (cAss); **109**: Konya, Akşehir env., 19.IV.1960, leg. Schubert (NHMW); **110**: Konya, Akşehir env., Sultan Dağları, 26.V.1960, leg. Petrowitz & Ressl (NHMW); **111**: same data, but 30.V.1960 (cAss); **112**: Niğde, Orhaniye, Çamardi env., Ala Dağlar, 1800–2200 m, 19.V.2005, leg. Vávra (cVav, cAss); **113**: Niğde, Orhaniye, Çamardi env., Ala Dağlar, 1800–2200 m, 19.V.2005, leg. Vávra (cVav, cAss); **114**: Mersin, Çamlıyayla, 10.V.–3.VI.1963, leg. Schubert (NHMW, cAss); **115**: Mersin, Çamlıyayla, V.1967, leg. Schubert (NHMW); **116**: Osmaniye, Osmaniye, 1200 m, VI.1967, leg. Schubert (NHMW); **117**: Hatay, Kavalcık, Reynanlı, 26.IV.2007 (cAnl); **118**: Hatay, Hassa, Akbez, 5 km E Koruhöyük, 36°48'N, 36°38'E, 410 m, 23.IV.2008, leg. Yağmur (cAnl); **119**: Hatay, Yayladağı, 3 km N Leylekli, 35°59'N, 36°03'E, 670 m, 17.V.2008, leg. Yağmur (cAnl); **120**: Hatay, Belen geçidi, 2.5 km N Kıcı, 36°30'N, 36°14'E, 950 m, 9.V.2008, leg. Yağmur (cAss); **121**: Istanbul, Alem Dağı, leg. v. Bodemeyer (BMNH); **122**: Sakarya, Adapazari, Sapanogölü, 6.IV.1966 (NHMW, cAss); **123**: Samsun, 25 km S Samsun, NE Asarcık, 41°05'N, 36°16'E, 880 m, *Fagus-Quercus-Carpinus* forest, litter in dry stream sifted, 20.VII.2008, leg. Schülke (cAss); **124**: Ordu, road Ünye–Akkuş, 18 km NE Akkuş, 40°56'N, 37°07'E, 920 m, mixed deciduous forest (predominantly *Fagus*), litter sifted, 15.VII.2008, leg. Schülke (cSch); **125**: Sinop, Çangal Dağı, 8.–16.VII.1961, leg. Schubert (NHMW); **126**: Sinop, Çangal Dağı, 16.–26.V.1957, leg. Schubert (cAss); **127**: Artvin, Borçka, 1.–3.VI.1960, leg. Schubert (NHMW); **128**: Erzurum, Dadaşköy, 1800 m, 7.VII.2005, leg. Kesdek (EME); **129**: Erzurum, Kombina, 5.IX.1988, leg. Özbek (EME); **130**: Erzurum, Erzurum, 22.VI.1980, leg. Özbek (EME); **131**: Rize, ca. 50 km SSE Rize, Ovitdağı geçidi, 40°38'N, 40°45'E, 2510 m, under stones, 25.VII.2006, leg. Schülke (cSch); **132**: Rize, 25 km SSE Rize, 7 km E Ikizdere, 40°47'N, 40°38'E, 1030 m, river bank, 31.VII.2006, leg. Schülke (cAss).

Omaliinae

Acidota cruentata Mannerheim, 1830 – 96 (2)
Anthobium abantense (Fagel, 1968) – 23 (1)
Anthobium cf. *abantense* (Fagel, 1968) (dark morph) – 41 (1), 53 (1), 63 (1)
Anthobium anatolicum (Fagel, 1968) – 40 (6), 53 (4), 89 (1)
Anthobium fusculum (Erichson, 1839) – 59 (1), 62 (1), 92 (1)
Anthobium hamatum (Luze, 1905) – 8 (1), 35 (1)
Anthobium metallicum (Luze, 1905) – 62 (132), 92 (1)
Boreaphilus velox (Heer, 1839) – 88 (1)
Coryphiodes anatolicus (Fagel, 1971) – 21 (1), 23 (1)
Coryphium angusticolle Stephens, 1834 – 23 (1)
Dialycera aspera (Eppelsheim, 1889) – 17 (1)
Dropephylla devillei (Bernhauer, 1902) – 63 (2)
Dropephylla ioptera (Stephens, 1834) – 2 (1), 22 (2), 25 (3), 26 (1), 32 (3)
Eusphalerum primulae Stephens, 1834 – 22 (2), 25 (1)
Eusphalerum caucasicum loebli Zanetti, 1993 – 13 (1), 22 (1)
Lesteva longoelytrata (Goeze, 1777) – 40 (1), 66 (5)
Mannerheimia brevipennis (Motschulsky, 1860) – 41 (2)
Omalium assingi Zanetti, 2002 – 41 (2), 62 (2), 80 (2), 81 (1), 89 (1)
Omalium cf. *cinnamomeum* Kraatz, 1857 (♀) – 9 (1)
Omalium rivulare (Paykull, 1789) – 15 (1), 35 (2)
Omalium rugatum Mulsant & Rey, 1880 – 62 (1), 78 (1), 80 (2)
Omalium schuberti Zanetti, 2002 – 66 (1)
Omalium turcicum Smetana, 1967 – 15 (1)
Olophrum cf. *piceum* (Gyllenhal, 1810) – 35 (1)

Proteininae

Megarthrus depressus (Paykull, 1789) – 26 (1), 28 (1)
Metopsia assingi Zerche, 1998 – 26 (1), 28 (1)
Proteinus brachypterus (Fabricius, 1792) – 15 (1), 23 (4), 35 (1), 80 (2)
Proteinus longicornis Dodero, 1923 – 28 (1)
Proteinus ovalis Stephens, 1834 – 40 (18), 60 (1), 62 (80), 63 (1)
Proteinus utrarius Assing, 2004 – 21 (1), 29 (1), 41 (1), 62 (6)

Micropeplinae

Arrhenopeplus turcicus (Coiffait, 1958) – 78 (4)
Micropeplus fulvus Erichson, 1840 – 39 (27), 40 (28), 53 (31), 70 (194), 78 (1), 89 (5)
Micropeplus marietti Jacquelin du Val, 1857 – 11 (1)

Tachyporinae

Bryoporus multipunctus Hampe, 1867 – 73 (1), 84 (1)
Ischnosoma meybohmi Schülke, 2003 – 89 (1)
Ischnosoma splendidum (Gravenhorst, 1806) – 16 (2), 28 (5)
Lordithon exoletus (Erichson, 1839) – 40 (5), 53 (2), 76 (1), 83 (2)
Lordithon lunulatus (Linnaeus, 1760) – 6 (1), 22 (2), 30 (1), 32 (1)
Lordithon thoracicus thoracicus (Fabricius, 1777) – 6 (1), 22 (1), 30 (1), 40 (2), 52 (1), 53 (2)
Lordithon trinotatus (Erichson, 1839) – 62 (11)
Mycetoporus eppelsheimianus Fagel, 1968 – 41 (1)
Mycetoporus glaber glaber (Sperk, 1835) – 6 (1), 70 (1), 72 (1)
Mycetoporus ignidorsum Eppelsheim, 1880 (♀♀) – 26 (1), 57 (1)
Mycetoporus imperialis Bernhauer, 1902 – 39 (2), 93 (1)

Mycetoporus punctus (Gravenhorst, 1806) – 8 (1), 23 (2)
Mycetoporus reichei (Pandellé, 1869) – 1 (1), 6 (1), 70 (2), 71 (3), 72 (6), 73 (1), 89 (1)
Mycetoporus rufescens (Stephens, 1832) – 35 (1)
Mycetoporus spp. (*baudueri* group) – 10 (1), 20 (1), 25 (1), 40 (2), 53 (3), 60 (1), 71 (1), 77 (1), 83 (1), 93 (2)
Mycetoporus sp. (*nigricollis* group ♀♀) – 1 (1), 9 (1), 78 (1)
Parabolitobius inclinans (Gravenhorst, 1806) – 73 (1)
Parabolitobius ponticus (Fagel, 1968) – 32 (1)
Sepedophilus immaculatus (Stephens, 1832) – 10 (1), 11 (1), 20 (3), 24 (1), 25 (1), 70 (1), 92 (3)
Sepedophilus obtusus (Luze, 1902) – 39 (1), 43 (1), 52 (1), 53 (3), 72 (8), 73 (4), 77 (1), 78 (4), 80 (5), 81 (2), 83 (6), 84 (1), 87 (7), 89 (4), 93 (5)
Sepedophilus testaceus (Fabricius, 1792) – 25 (5), 29 (1), 39 (1), 40 (10), 52 (5), 53 (7), 70 (4), 71 (3), 72 (1), 78 (2), 82 (2)
Sepedophilus sp. – 38 (1)
Tachinus bonvouloiri Pandellé, 1869 – 41 (1), 55 (1), 59 (2)
Tachinus corticinus Gravenhorst, 1802 – 25 (1), 28 (2), 37 (2), 51 (1), 66 (1)
Tachinus discoideus Erichson, 1839 – 80 (1)
Tachinus fimetarius Gravenhorst, 1802 – 44 (1), 45 (1), 54 (1), 55 (4)
Tachinus lackneri Schülke, 2013 – 23 (1)
Tachinus rufipes (Linnaeus, 1758) – 39 (2)
Tachyporus assingi Schülke, 1997 – 11 (1)
Tachyporus cf. *atriceps* Stephens, 1832 (♀) – 89 (1)
Tachyporus caucasicus Kolenati, 1846 – 11 (1), 12 (1), 19 (3), 20 (1), 30 (2), 52 (1)
Tachyporus chrysomelinus (Linnaeus, 1758) – 43 (1)
Tachyporus hypnorum (Fabricius, 1775) – 60 (1)
Tachyporus nitidulus (Fabricius, 1781) – 53 (1), 62 (1), 64 (1), 68 (3), 72 (2), 83 (3)
Tachyporus pusillus Gravenhorst, 1806 – 43 (1), 51 (1), 66 (1)
Tachyporus solutus Erichson, 1839 – 12 (1)

Habrocerinae

Habrocerus pisidicus Korge, 1971 – 10 (1), 11 (2), 40 (46), 53 (28), 70 (12), 76 (1), 78 (4), 95 (3)
Habrocerus simulans Assing & Wunderle, 1995 – 73 (2)

Aleocharinae

Acrotona piceorufa (Mulsant & Rey, 1873) – 70 (45)
Aleochara grandeguttata Assing, 2009 – 52 (1), 68 (2), 93 (1)
Aleochara haematoptera Kraatz, 1858 – 113 (2)
Aleochara hamulata Assing, 2009 – 35 (1)
Aleochara lanuginosa Gravenhorst, 1802 – 124 (1)
Aleochara laticornis Kraatz, 1856 – 20 (1), 71 (1)
Aleochara subtumida (Hochhuth, 1849) – 6 (1), 25 (1), 32 (1)
Alevonota libanotica (Fagel, 1965) – 68 (1), 73 (1), 78 (4), 92 (1)
Alevonota rufotestacea (Kraatz, 1856) – 75 (1), 82 (5), 92 (1)
Aloconota gregaria (Erichson, 1839) – 49 (1), 50 (1), 51 (1), 67 (1)
Amarochara siculifera Assing, 2002 – 79 (1), 86 (1)
Amischa bifoveolata (Mannerheim, 1830) – 28 (3)
Amischa filum (Mulsant & Rey, 1870) – 68 (16)
Amischa forcipata Mulsant & Rey, 1873 – 122 (2)
Amischa nigrofusca (Stephens, 1832) – 68 (1)
Anaulacaspis cf. *nigra* (Gravenhorst, 1802) – 67 (1)
Atheta aegra (Heer, 1841) – 37 (1), 54 (1), 56 (2), 57 (1), 66 (1)
Atheta aeneicollis (Sharp, 1869) – 71 (1), 78 (2), 87 (1), 89 (4)
Atheta atramentaria (Gyllenhal, 1810) – 26 (1)
Atheta benickiella Brundin, 1948 – 4 (1), 6 (1), 15 (5), 21 (14), 22 (2), 23 (6), 25 (4), 28 (6), 30 (2), 53 (8)
Atheta brachati n. sp. – 28 (2)
Atheta britanniae Bernhauer & Scheerpeltz, 1926 – 1 (1), 23 (1)
Atheta castanoptera (Mannerheim, 1830) – 17 (1), 28 (1)
Atheta dadopora Thomson, 1867 – 35 (2)
Atheta laevigata (Hochhuth, 1849) – 50 (3)
Atheta palustris (Kiesenwetter, 1844) – 2 (1)
Atheta putrida (Kraatz, 1856) – 28 (1), 41 (5)
Atheta scabens n. sp. – 131 (1), 132 (1)
Atheta sodalis (Erichson, 1837) – 23 (4), 25 (3), 28 (3)
Atheta testaceipes (Heer, 1839) – 53 (1)
Atheta tibialis (Heer, 1839) – 28 (1)
Atheta trinotata (Kraatz, 1856) – 28 (1)
Atheta (*Microdota*) spp. – 13 (1), 52 (1), 55 (7), 56 (1), 58 (1), 60 (2), 78 (1), 79 (3), 82 (3), 85 (1), 89 (2), 92 (1)
Atheta (*Mocyta*) spp. – 11 (1), 30 (1), 41 (1), 76 (1), 78 (10), 86 (1), 87 (1), 89 (2), 92 (1)
Atheta sp. – 13 (2)
Bolitochara bella Märkel, 1844 – 16 (1), 36 (1)
Bolitochara lauferi Bernhauer, 1908 – 53 (6), 62 (2), 63 (6), 70 (1), 80 (1)
Callicerus rigidicornis (Erichson, 1839) – 35 (1)
Calodera aethiops (Gravenhorst, 1802) – 12 (1)
Caloderina hierosolymitana (Saulcy, 1865) – 86 (1), 114 (2), 115 (1), 116 (1)
Cordalia anatolica Assing, 2001 – 70 (10)
Cousya crocea Assing, 2004 – 82 (4), 89 (1)
Cousya microdotoides n. sp. – 79 (4), 81 (3)
Cousya spp. – 41 (1), 58 (3), 62 (1), 64 (2), 92 (1)
Cypha spathulata Assing, 2007 – 83 (1), 89 (1)
Cypha tarsalis (Luze, 1902) – 25 (1)
Cypha tenebricosa Assing, 2004 – 91 (1)
Drusilla limata Assing, 2005 – 56 (7), 57 (20), 59 (1)
Enalodroma hepatica (Erichson, 1839) – 53 (2)
Geostiba aequa Assing, 2011 – 73 (4)
Geostiba fodens Assing, 2011 – 56 (19), 57 (26), 58 (6)
Geostiba lucens (Benick, 1970) – 93 (2), 94 (1)
Geostiba oertzeni (Eppelsheim, 1888) – 4 (3), 5 (6), 6 (1), 20 (2), 23 (1), 24 (1), 35 (9)
Geostiba perfodens Assing, 2011 – 54 (6), 55 (186)
Geostiba pungens Assing, 2011 – 68 (6), 69 (25), 70 (1)
Geostiba rhodiensis Pace, 1983 – 85 (2), 89 (42)
Geostiba sultanica Assing, 2008 – 40 (1), 53 (1)
Geostiba uhligi Pace, 1983 – 1 (16), 8 (31)
Geostiba (*Tropogastrosipalia*) sp. (♀) – 23 (1)
Gyrophaena affinis Mannerheim, 1830 – 6 (1)
Gyrophaena bihamata Thomson, 1867 – 24 (1), 30 (2)
Gyrophaena gentilis Erichson, 1839 – 5 (1), 15 (1), 26 (7), 32 (1), 33 (1), 34 (1)
Gyrophaena joyioides Wüsthoff, 1937 – 22 (8), 25 (1), 26 (4), 30 (1)
Holobus flavicornis (Lacordaire, 1835) – 22 (1)
Homoeusa spp. – 70 (2), 75 (2), 76 (1), 82 (1), 84 (20)
Leptusa confinis Pace, 1982 – 6 (1), 17 (1)
Leptusa asiatica Bernhauer, 1909 – 6 (3), 8 (10), 13 (2), 14 (3), 15 (7), 16 (1), 17 (1), 21 (11), 22 (17), 23 (41), 24 (3), 25 (6), 26 (13), 27 (4), 28 (9), 29 (7), 30 (6), 31 (1), 32 (6), 33 (3), 34 (2), 35 (15), 36 (1)
Leptusa fuliginosa (Aubé, 1850) – 35 (2)

Leptusa merkli Bernhauer, 1900 – 1 (13), 2 (3), 3 (7), 5 (4), 6 (11), 7 (1), 9 (5), 18 (1), 20 (6)
Liogluta akiana Assing, 2004 – 55 (1), 56 (1), 68 (11)
Liogluta falcata Assing, 2010 – 23 (2)
Liogluta longiuscula (Gravenhorst, 1802) – 5 (1), 13 (1), 25 (1), 53 (1), 57 (10), 62 (16), 75 (1), 79 (1), 82 (1)
Maurachelia roubali (Lohse, 1970) – 67 (1)
Megalogastria cingulata (Eppelsheim, 1889) – 9 (2)
Meotica decolor Assing, 2004 – 78 (4)
Meotica subnigra Assing, 2006 – 108 (1)
Meotica truncata Assing, 2004 – 73 (1)
Meotica marchica Benick, 1953 – 4 (1)
Meotica wunderlei n. sp. – 67 (10)
Myrmecopora effeminata Assing, 2004 – 76 (1), 77 (4), 78 (6), 87 (2), 92 (1), 95 (4)
Myrmoecia perezii (Uhagón, 1876) – 2 (1)
Myrmoecia plicata (Erichson, 1837) – 83 (1)
Notothecta flavipes (Gravenhorst, 1806) – 40 (1)
Ocalea sp. aff. *ruficollis* Eppelsheim, 1888 – 80 (1)
Ocalea sp. – 6 (1), 7 (1), 8 (1), 12 (3), 15 (1), 16 (3), 22 (3), 23 (1), 25 (3), 41 (1)
Oligota pumilio Kiesenwetter, 1858 – 39 (1), 40 (1), 55 (1), 109 (2), 110 (1), 111 (1)
Oxypoda abdominalis (Mannerheim, 1830) – 112 (3)
Oxypoda acuminata (Stephens, 1832) – 22 (1)
Oxypoda antennata Bernhauer, 1902 – 28 (1), 40 (2), 41 (1), 45 (1), 62 (2)
Oxypoda brachati Assing, 2004 – 75 (1), 85 (2), 90 (1)
Oxypoda brevicornis (Stephens, 1832) – 1 (3), 4 (2)
Oxypoda obscuricollis Assing, 2007 – 62 (1)
Oxypoda cristata Assing, 2006 – 28 (2), 40 (1), 41 (2), 62 (3), 64 (2), 81 (1), 93 (2), 94 (1), 97 (3), 98 (1), 99 (2), 100 (1), 101 (8), 105 (1)
Oxypoda fissa Assing, 2006 – 41 (2), 54 (5), 55 (3), 64 (1)
Oxypoda flavicornis Kraatz, 1856 – 1 (4), 15 (5), 28 (23), 30 (1), 79 (2)
Oxypoda ignorata Zerche, 1996 – 62 (5)
Oxypoda libanotica Fagel, 1965 – 68 (4), 70 (1)
Oxypoda longipes Mulsant & Rey, 1861 – 62 (2)
Oxypoda lurida Wollaston, 1857 – 74 (1), 78 (2), 91 (1)
Oxypoda miricornis Assing, 2009 – 80 (1)
Oxypoda opaca (Gravenhorst, 1802) – 13 (6), 23 (1), 26 (2), 35 (4)
Oxypoda pungens Assing, 2012 – 23 (1)
Oxypoda scheerpeltziana (Fagel, 1968) – 80 (1), 81 (4), 83 (2), 88 (3), 92 (1), 93 (5)
Oxypoda subspectabilis Assing, 2007 – 123 (1)
Oxypoda vicina Kraatz, 1858 – 46 (1)
Oxypoda (*Baeoglena*) spp. – 9 (1), 13 (3), 23 (1), 25 (2), 28 (3), 29 (10), 40 (43), 41 (1), 52 (1), 53 (35), 71 (8), 78 (1), 84 (2)
Oxypoda spp. (♀♀) – 67 (1), 68 (2), 69 (1)
Pella erratica (Hagens, 1863) – 73 (1)
Pella similis (Märkel, 1844) – 12 (1)
Pella sp. aff. *humeralis* (Gravenhorst, 1802) – 2 (2), 13 (1), 17 (1), 20 (1), 23 (5), 24 (1), 25 (2), 26 (2), 30 (1), 32 (1)
Peltodonia bodemeyeri (Bernhauer, 1936) – 95 (1)
Thiasophila angulata (Erichson, 1837) – 40 (14)
Tropimenelytron tuberiventre (Eppelsheim, 1880) – 125 (1), 126 (1), 127 (1)

Oxytelinae

Anotylus clypeonitens (Pandellé, 1867) – 7 (1), 12 (1)
Anotylus inustus (Gravenhorst, 1806) – 5 (1), 74 (2), 87 (1), 92 (1)
Anotylus pumilus (Erichson, 1839) – 39 (1)
Anotylus sculpturatus (Gravenhorst, 1806) – 33 (1)
Aploderus lydicus Assing, 2007 – 53 (6)
Carpelimus atomus (Saulcy, 1864) – 106 (1), 107 (1)
Carpelimus corticinus (Gravenhorst, 1806) – 45 (1)
Platystethus brevipennis Baudi di Selve, 1857 – 51 (1), 60 (29), 67 (1)
Platystethus nitens (Sahlberg, 1832) – 11 (1), 12 (2), 68 (1)

Steninae

Stenus bithynicus n. sp. – 1 (1), 7 (1), 8 (5), 15 (1), 33 (2)
Stenus capitulatus Assing, 1995 – 58 (1)
Stenus coarcticollis Eppelsheim, 1890 – 20 (1), 24 (1), 25 (1), 28 (4), 31 (1)
Stenus glacialis Heer, 1839 – 18 (1), 53 (5), 59 (3), 70 (3), 86 (2)
Stenus impressus Germar, 1824 – 11 (1)
Stenus ochropus Kiesenwetter, 1858 – 53 (5), 70 (12), 72 (2), 83 (5), 89 (4), 92 (1)
Stenus subaeneus Erichson, 1840 – 35 (4), 87 (1)
Stenus turbulentus Bondroit, 1912 – 10 (2), 11 (2), 12 (2), 70 (16), 75 (1), 76 (4), 77 (2), 78 (4), 82 (4), 87 (6), 88 (2), 89 (4), 95 (2)

Paederinae

Achenium anatolicum Jarrige, 1952 – 66 (89), 67 (18), 68 (3)
Astenus lyonessius (Joy, 1908) – 69 (1)
Astenus procerus (Gravenhort, 1806) – 74 (1)
Astenus sultanicus Assing, 2010 – 54 (6), 55 (86)
Astenus thoracicus (Baudi di Selve, 1857) – 42 (1), 43 (2), 49 (1), 54 (1), 55 (2), 56 (15), 57 (18), 58 (1), 61 (1), 65 (4), 66 (8), 67 (1)
Astenus sp. aff. *thoracicus* (Baudi di Selve, 1857) – 10 (1), 74 (11), 75 (1), 77 (1)
Astenus spp. (♀♀) – 49 (1), 56 (1), 67 (1)
Homaeotarsus chaudoirii (Hochhuth, 1851) – 87 (1), 121 (1)
Lathrobium bodemeyeri Bernhauer, 1903 – 10 (1), 13 (2), 14 (1), 16 (6), 26 (1), 32 (1), 36 (4)
Leptobium gracile (Gravenhorst, 1802) – 46 (3), 66 (7), 67 (67), 68 (27)
Leptobium syriacum (Saulcy, 1865) – 74 (3), 86 (1)
Luzea graeca (Kraatz, 1857) – 67 (1), 68 (3)
Medon brunneus (Erichson, 1839) – 9 (4)
Medon dilutus pythonissa (Saulcy, 1865) – 10 (1), 11 (2), 12 (5), 53 (1), 73 (2), 84 (1), 92 (1)
Medon ferrugineus (Erichson, 1840) – 11 (1), 12 (1), 54 (4)
Medon fusculus (Mannerheim, 1830) – 11 (2), 54 (1), 55 (1), 70 (1), 71 (2), 72 (2), 73 (2)
Medon lanugo Assing, 2004 – 70 (2), 71 (8), 72 (1), 73 (2), 78 (1), 87 (5)
Medon maronitus (Saulcy, 1865) – 70 (2), 78 (1)
Medon meybohmi Assing, 2007 – 89 (4)
Medon semiobscurus (Fauvel, 1875) – 70 (3), 71 (6), 76 (1), 77 (1), 78 (5), 82 (5), 86 (1), 89 (2)
Micranops pilicornis (Baudi di Selve, 1870) – 50 (1), 78 (10)
Rugilus lesbius Assing, 2005 – 11 (1), 12 (2), 25 (1), 26 (1)
Rugilus rufipes Germar, 1836 – 4 (1), 16 (2)
Rugilus tauricus (Rougemont, 1988) – 40 (2), 70 (13), 83 (1 ♀)
Scopaeus bituberculatus Frisch, 2002 – 87 (1)
Scopaeus debilis Hochhuth, 1851 – 4 (1)
Scopaeus loebli Frisch, 1997 – 78 (1)
Scopaeus trifurcatus Frisch, 2002 – 55 (4)

Scymbalium anale (Nordmann, 1837) – 66 (2), 67 (4)
Sunius adanensis (Lokay, 1919) – 42 (3), 86 (1), 89 (2)
Sunius aequus Assing, 2011 – 68 (4), 69 (93)
Sunius melanocephalus (Fabricius, 1792) – 2 (1), 12 (1), 29 (2), 41 (1), 55 (3)
Sunius sultanicus Assing, 2011 – 54 (13), 55 (221)
Sunius ulcerosus Assing, 2011 – 66 (17)

Staphylininae

Atrecus affinis (Paykull, 1789) – 15 (1), 21 (2)
Bisnius fimetarius (Gravenhorst, 1802) – 14 (1), 15 (1), 26 (2), 32 (1), 34 (1)
Gabrius breviventer (Sperk, 1835) – 26 (1)
Gabrius spp. (♀♀) – 46 (1), 53 (1), 68 (1)
Gauropterus sanguinipennis (Kolenati, 1846) – 102 (6)
Gyrohypnus angustatus Stephens, 1833 – 23 (1), 40 (9), 128 (1), 129 (1), 130 (1)
Gyrohypnus punctulatus (Paykull, 1789) – 33 (1)
Heterothops cf. *dissimilis* (Gravenhorst, 1802) – 40 (1), 55 (5), 84 (1)
Heterothops cf. *minutus* Wollaston, 1860 – 57 (1)
Heterothops sp. – 45 (1)
Leptacinus nigerrimus Coiffait, 1971 – 68 (2)
Megalinus scutellaris (Fauvel, 1900) – 103 (1)
Nudobius lentus (Gravenhorst, 1806) – 26 (1)
Ocypus curtipennis Motschulsky, 1849 – 85 (1)
Ocypus fulvipennis Erichson, 1840 – 16 (1)
Ocypus mus (Brullé, 1832) – 51 (1), 84 (1)
Ocypus picipennis (Fabricius, 1792) – 42 (2), 54 (1), 58 (1), 65 (1), 66 (12), 67 (13)
Othius laeviusculus Stephens, 1833 – 79 (1), 92 (1)
Othius lapidicola Märkel & Kiesenwetter, 1848 – 15 (1), 21 (2), 28 (1), 39 (12), 40 (2), 41 (3), 53 (6), 73 (1)
Othius punctulatus (Goeze, 1777) – 32 (1), 39 (3), 40 (1)
Philonthus carbonarius (Gravenhorst, 1802) – 41 (1)
Philonthus concinnus (Gravenhorst, 1802) – 38 (1), 55 (1), 66 (1)
Philonthus debilis (Gravenhorst, 1802) – 47 (1)
Philonthus intermedius (Lacordaire, 1835) – 2 (1)
Philonthus parvicornis (Gravenhorst, 1802) – 68 (1)
Philonthus quisquiliarius (Gyllenhal, 1810) – 50 (1)
Platydracus chalcocephalus (Fabricius, 1801) – 1 (1)
Quedius boluensis Korge, 1971 – 25 (1), 30 (1)
Quedius boops (Gravenhorst, 1802) – 15 (1), 21 (1), 36 (1)
Quedius cinctus (Paykull, 1790) – 21 (2)
Quedius coloratus Fauvel, 1875 – 71 (1), 73 (1), 84 (1), 87 (1)
Quedius humeralis Stephens, 1832 – 35 (2)
Quedius lateralis (Gravenhorst, 1802) – 70 (1)
Quedius limbatus (Heer, 1839) – 8 (1), 20 (2), 23 (2), 30 (1), 36 (2)
Quedius cf. *molochinus* (Gravenhorst, 1806) (♀) – 67 (1)
Quedius nemoralis Baudi di Selve, 1848 – 1 (2), 9 (4), 20 (1), 21 (1), 23 (1), 29 (1), 53 (10), 80 (1), 82 (1)
Quedius nitipennis (Stephens, 1833) – 9 (1)
Quedius cf. *ochropterus* Erichson, 1840 (♀♀) – 40 (3), 41 (1)
Quedius pseudonigriceps Reitter, 1909 – 9 (1), 10 (1), 72 (1), 73 (2), 89 (3)
Quedius semiaeneus (Stephens, 1833) – 9 (1), 10 (1)
Quedius umbrinus Erichson, 1839 – 16 (3), 31 (1), 32 (2)
Quedius spp. (♀♀) – 35 (1), 39 (1), 40 (4), 53 (2), 62 (2), 70 (2), 86 (1), 89 (1)
Stenistoderus cephalotes (Kraatz, 1858) – 46 (2), 67 (1)
Tasgius falcifer (Nordmann, 1837) – 38 (1)
Xantholinus audrasi Coiffait, 1956 – 7 (1), 16 (1), 84 (1)
Xantholinus ciliciae Bordoni, 1971 – 71 (1), 75 (1), 78 (1), 86 (1), 95 (1)
Xantholinus laevigatus Jacobsen, 1849 – 28 (1), 32 (1)
Xantholinus rufipennis Erichson, 1839 – 43 (1), 104 (1), 117 (1), 118 (1), 119 (1), 120 (1)
Xantholinus spp. (♀♀) – 38 (1), 43 (2), 46 (4), 60 (2), 61 (1), 66 (4)

3.2 Remarks on some species

Acidota cruentata Mannerheim, 1830

This species has a trans-Palaearctic distribution (Smetana 2004), but was reported from Turkey (Kastamonu) for the first time only recently (Assing 2011a). The specimens listed in section 3.1 represent the first record from southern Turkey. The aedeagus of the male from Antalya is somewhat smaller than that of material seen from other regions, but otherwise no evidence was found suggesting that the specimens should represent a distinct species. The elytra are distinctly longer than those of *Acidota brevis* Assing, 2004. Both specimens are micropterous.

Anthobium abantense (Fagel, 1968)

According to the original description, which is based on two males from the vicinity of the Abant Gölü (Bolu), *A. abantense* is distinguished from *L. atrocephalum* (Gyllenhal, 1827) by the darker coloration and by some minor differences in body proportions and other external characters (Fagel 1968). Material matching the original description was examined from northwestern Turkey eastwards to Kastamonu, from western Anatolia (Izmir, Aydın), and from the Sultan Dağları in Konya. Some of these records were reported as *A. atrocephalum* by Assing (2011a). Specimens of the typical coloration of *A. atrocephalum* have so far been seen only from northeastern Anatolia (Rize). Whether or not *A. abantense* and *A. atrocephalum* really represent different species requires clarification in the context of a revision on a larger scale. I have seen material with a similar coloration and other external characters also from various regions in Greece and from other Balkan countries.

Another morph of even darker coloration was recorded from southern Anatolia, from Afyon and Konya in the west to Adana and Adıyaman in the east. The records from the latter two provinces were reported as *A. atrocephalum* by Assing (2004b, 2006a). At present, it is unclear if these populations represent a regional colour variation of *A. atrocephalum* or *A. abantense*, or a distinct species.

Anthobium metallicum (Luze, 1905) (Fig. 1)

Type material examined: Holotype (♀), "*melanoceph.* Akbes, Syria. Staudinger. / c. Epplsh. Steind. d. / Type. *metallicum* Luze / Typus" (NHMW).

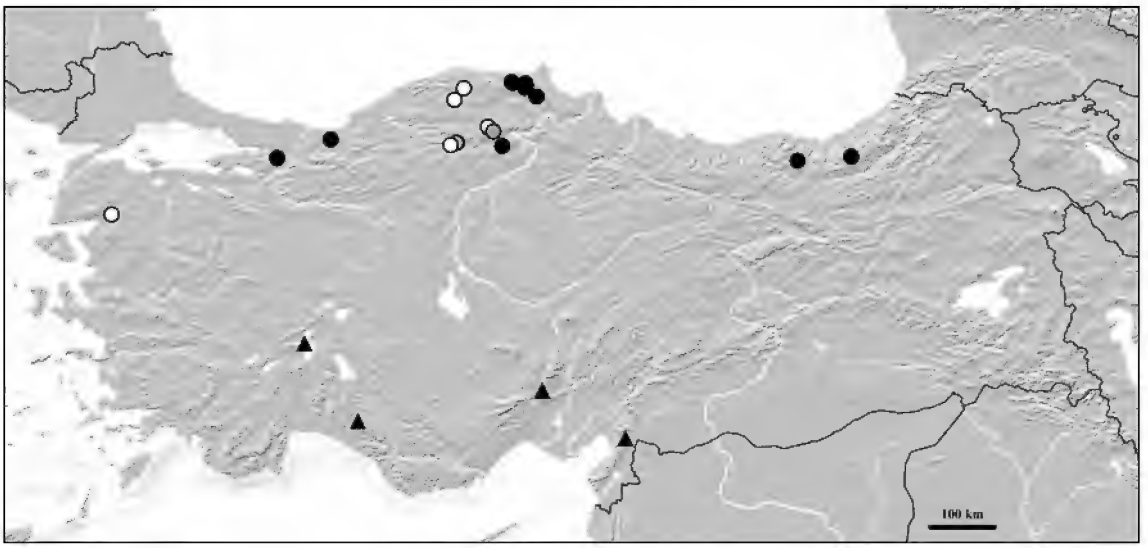


Fig. 1. Distribution of the species of the *Anthobium melanocephalum* group in Turkey: *A. melanocephalum* (white and grey circles); *A. hamatum* (black and grey circles); *A. metallicum* (triangles).

The original description is based on a single female from "Syrien (Akbes)" (Luze 1905), which is probably Akbez in the Turkish province Hatay today. Scheerpeltz (1961) reported the species from Lebanon and Syria.

The species is distinguished from the similar and closely related *A. melanocephalum* (Illiger, 1794) particularly by the following characters: head posteriorly without transverse furrow connecting the ocelli, with less pronounced lateral furrows, and with flat median dorsal portion (*A. melanocephalum*: ocelli connected by more or less pronounced transverse furrows, lateral furrows pronounced; median dorsal portion of head convexly and often somewhat irregularly elevated); pronotum less broad and less transverse, with less strongly excavated anterior margin, and with less marked posterior angles; lateral margins of pronotum less strongly convex and – at most – very indistinctly sinuate posteriorly. According to Luze (1905) and Scheerpeltz (1961), *A. metallicum* is characterised by a metallic hue on the head and pronotum, but such a hue is absent or indistinct both in the holotype and in the Turkish material examined.

The two specimens reported as *A. melanocephalum* from Antalya by Assing (2004b) refer to *A. metallicum*. In Turkey, the distribution of *A. metallicum* is confined to the south (Fig. 2).

Anthobium melanocephalum (Illiger, 1794) (Fig. 1)

This species was recorded from Turkey by Assing (2010a, 2011a). Since the previous record from Antalya is based on a misidentification, the distribution of *A. melanocephalum* in Turkey is confined to the northwest (Fig. 1).

Anthobium hamatum (Luze, 1905) (Fig. 1)

Anthobium hamatum had been known only from the Caucasus region (Georgia, Armenia) until recently when it was reported also from Turkey (Assing 2010a, 2011a). In two localities it was found together with *A. melanocephalum*. In Turkey, its distribution is confined to the north (Fig. 1).

Coryphiodes anatolicus (Fagel, 1971) (Fig. 2)

This rare and local species is endemic to northwestern Anatolia. Until recently, when it was reported from Sinop and Bolu (Assing 2010a, 2011a), *C. anatolicus* had been recorded only from the type locality in the Uludağ (Bursa). The currently known distribution is illustrated in Fig. 2.

Coryphium angusticolle Stephens, 1834

The identification of the male specimen listed in section 3.1 is not absolutely certain. It has a somewhat larger and broader body than material of *C. angusticolle* that I have seen from other regions, but I have been unable to find any additional, convincing evidence that it should represent a distinct species. It is most unlikely to be conspecific with *C. turcicum* Zerche, 1993, whose description is based on a single teneral female from Artvin. According to Zerche (1993), *C. turcicum* has a forebody with pronounced microsculpture, which is absent in the specimen from Bolu. *Coryphium angusticolle* was previously unknown from Turkey.

Dropephylla ioptera (Stephens, 1834)

The previously known distribution of this widespread species ranged from the Balkans and Ukraine across East

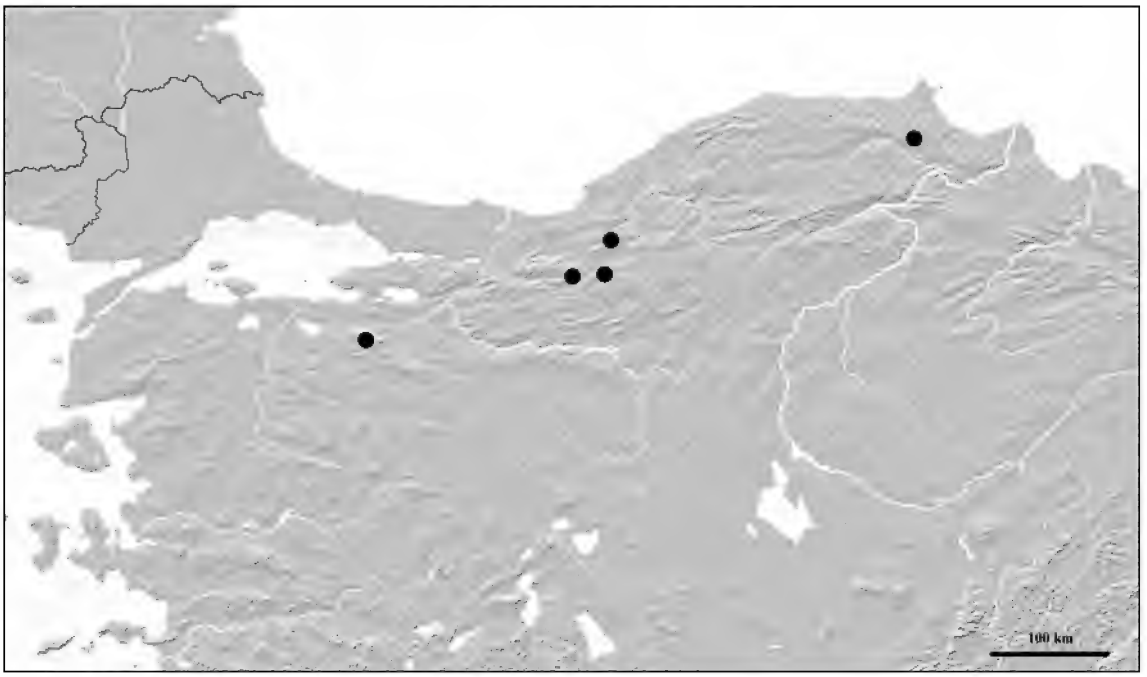


Fig. 2. Distribution of *Coryphiodes anatolicus* in northwestern Turkey.

Europe, Central Europe, and Italy to France, the British Isles, and Scandinavia, with a record also from Algeria (Smetana 2004). The specimens listed in section 3.1 expand the distribution to the southeast and represent the first records from Turkey.

Mannerheimia brevipennis (Motschulsky, 1860)

Additional material examined: Iraq: 1 ex., Rawanduz, 36°30'N, 44°36'E, 1200–1400 m, pitfall, XI.2007–III.2008, leg. Reuter (cFel).

The known distribution of this rare species ranges from Scandinavia to East Siberia. In Turkey, it had been reported from a few localities in Ankara, Kahramanmaraş, Adıyaman, Gümüşhane, and Kayseri provinces (Assing 2007a). The material from Afyon (section 3.1) extends the distribution in Turkey further to the southwest. The above specimen from Iraq represents a new country record.

Proteinus longicornis Dodero, 1923

According to Smetana (2004), the distribution of *P. longicornis* ranges from France across Central Europe and Italy to Ukraine. The specimen listed in section 3.1 represents the first record from Turkey and considerably expands the distribution towards the southeast.

Micropeplus marietti Jacquelin du Val, 1857

The distribution of *M. marietti* ranges from France to Turkmenistan. Very recently, it was reported from Turkey (Aksaray) for the first time (Assing 2010a).

Parabolitobius ponticus (Fagel, 1968)

The original description of *P. ponticus* is based on five specimens from "Anatolie: Abant Dagh" (Fagel 1968). The male listed in section 3.1 represents the first record since the original description.

Tachyporus assingi Schülke, 1997

According to Schülke (2012), this species is distributed in the Balkans and Turkey, but primary records from Turkey were previously unknown.

Aleochara hamulata Assing, 2009

The distribution of *A. hamulata* includes Greece, Croatia, Iraq, and Anatolia, where it was previously known only from the southwest (Assing 2009a). The specimen from Düzce (section 3.1) represents the first record from northwestern Turkey.

Aleochara subtumida (Hochhuth, 1849)

Aleochara subtumida, a rarely recorded species, is distributed in Turkey and the Caucasus region. For a map illustrating its distribution see Assing (2009b).

Amarochara siculifera Assing, 2002

The distribution of *A. siculifera* is confined to central southern Anatolia, where it was previously known only from three localities in Mersin and Hatay (Assing 2002, 2003a).

Calodera aethiops (Gravenhorst, 1802)

According to Assing (1996), *C. aethiops* is widespread in the West Palaearctic region, but was previously unknown from Turkey. The male listed in section 3.1 represents a new country record. *Calodera aethiops* is the third species of the genus to be reported from Turkey.

Cypha tarsalis (Luze, 1902)

The previously known distribution of *C. tarsalis* ranges from West Europe across Italy, North, and Central Europe eastwards to the Russian Central European territory (Smetana 2004). It had been reported neither from the Balkans nor from Turkey. The male listed in section 3.1 represents the first record from Turkey and, by far, the southeasternmost record of this species.

Drusilla limata Assing, 2005

Except for *D. canaliculata* (Fabricius, 1787), all the *Drusilla* species in southern Anatolia are local endemics. *Drusilla limata* was previously known from a few localities in Antalya and Karaman provinces (Assing 2005, 2009c).

Leptusa merkli Bernhauer, 1900 (Fig. 3)

The distribution of *L. merkli* is confined to northwestern Turkey (Assing 2009d) and adjacent to that of *L. asiatica* (Fig. 3).

Leptusa asiatica Bernhauer, 1909 (Fig. 3)

Leptusa flagellulifera Assing, 2009d: 1290 ff.; **n. syn.**

Based on the shape and internal structures of the aedeagus, as well as for zoogeographic reasons, *L. flagellulifera* was attributed to the subgenus *Stictopisalia* Scheerpeltz, 1966, and distinguished from its Turkish representatives. While examining the material listed in section 3.1, however, it was discovered that *L. flagellulifera* is conspecific with *L. asiatica*, which has been attributed to *Oncopisalia* Pace, 1982 (Pace 1989). Apart from *L. asiatica*, this subgenus previously included four species, three from Makedhonia (Greece) and one from Albania. Based on both external and the male sexual characters, it seems somewhat doubtful that *L. asiatica* should be more closely related to *L. monachorum* Bernhauer, 1902, the type species of *Oncosipalia*, than to *L. merkli* and other Turkish species of *Stictopisalia*. Externally, *Leptusa asiatica* and *L. merkli* are practically indistinguishable. Moreover, no significant differences were found in the male secondary sexual characters and the general morphology of the aedeagus, except for the somewhat asymmetric structure of the internal sclerites. The apical internal structures are very similar. Future studies with a phylogenetic approach will have to show if *Oncopisalia* represents a distinct taxon or if it is nested within *Stictopisalia*.

Unlike other Turkish species of *Stictopisalia*, *L. asiatica* appears to be widespread in Turkey. The vast majority of records is from northwestern Anatolia. However, several specimens from the vicinity of the Van lake and from Osmaniye were found in the Schubert collection at the NHMW (Assing 2003b). Since recent records from these regions are unknown, the possibility that the respective specimens are mislabelled cannot be ruled out completely. In northwestern Anatolia, the distribution of *L. asiatica* is adjacent to – and partly slightly overlaps with – that of *L. merkli* (Fig. 3).

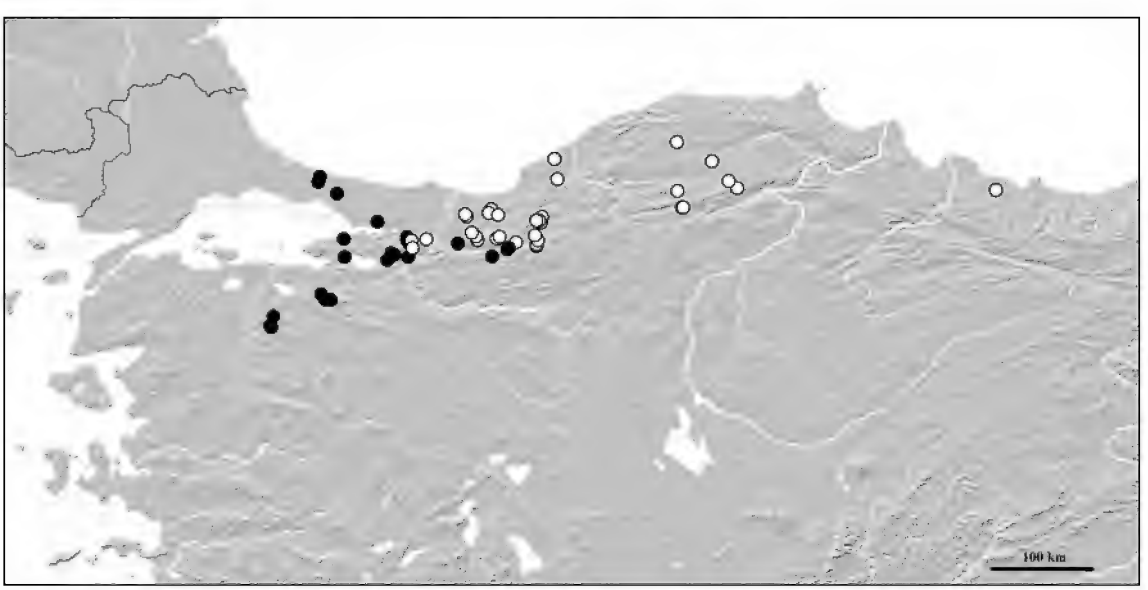


Fig. 3. Distributions of *Leptusa merkli* (black circles) and *L. asiatica* (white circles) in northwestern Turkey. Records of *L. asiatica* from other Turkish regions are omitted; they are mapped in Assing (2003b).

Maurachelia roubali (Lohse, 1970)

Only few records of *M. roubali* have been reported from Austria, Slovakia, and Greece (Assing 2004a). The specimen listed in section 3.1 represents the first record from Turkey.

Meotica marchica Benick, 1953 (Fig. 43)

The previously known distribution of *M. marchica* ranged from Central Europe to Greece (Assing 2004a). The male listed in section 3.1 represents the first record from Turkey; its aedeagus is illustrated in Fig. 43.

Meotica subnigra Assing, 2006

Additional material examined. Greece: 1♂, Pelopónnisos, 10 km NE Githio, 36°24'N, 22°37'E, 23.III.1997, leg. Assing (cAss).

This species was previously known only from the type locality in Kahramanmaraş (Assing 2006b). The specimen from Muğla (section 3.1) represents the second record from Turkey, the above male from the Pelopónnisos the first record from Greece.

Myrmoecia perezii (Uhagón, 1876)

This extremely rare species was originally described based on two specimens found in association with "*Tapinoma erratica* Latr." in Badajoz (Spain) (Uhagón 1876). It was subsequently reported also from Morocco, Slovakia, and the Czech Republic, always with the ant "*Tapinoma erraticum* (Latreille, 1789)" (Bernhauer 1940, Dvořák 1965, Roubal 1932, Smetana 2004, Vávra 2002). The male from Kocaeli (section 3.1), which was compared with a specimen from Slovakia (deposited in NHMW) and which too was found associated with *Tapinoma* sp., considerably expands the known distribution towards the southeast and represents the first record from Turkey.

Oxypoda obscuricollis Assing, 2007

Oxypoda obscuricollis was previously known only from two localities in Mersin and Kahramanmaraş provinces (Assing 2007b, 2009e).

Oxypoda miricornis Assing, 2009

The specimen from Adana (section 3.1) represents the first record since the original description, which is based on two males from the type locality in Kahramanmaraş (Assing 2009e).

Oxypoda pungens Assing, 2012

The distribution of this very recently described species includes both northern and southern Anatolia. The specimen from Bolu (section 3.1) represents a new province record.

Pella erratica (Hagens, 1863)

The distribution of *P. erratica* includes practically all of the Mediterranean and northwards extends into Central Europe, but records, particularly recent ones, are extremely scarce. Very recently, it was reported from Turkey (Sinop) for the first time (Assing 2009c). The specimen from Niğde (section 3.1) represents the second record from Turkey and the first record from southern Anatolia.

Peltodonia bodemeyeri (Bernhauer, 1936)

Peltodonia bodemeyeri, the sole representative of the genus known from the West Palaearctic region, is widespread in Turkey, but rather rare. Its distribution is mapped by Assing (2009c). The specimen from Adana represents a new province record.

Carpelimus atomus (Saulcy, 1864)

The distribution of *C. atomus* extends from Northwest Africa to the Middle East and Afghanistan. The specimens from Muğla (section 3.1) represent the first records from Turkey.

Stenus capitulatus Assing, 1995

This rare myrmecophilous species was originally described from southern Greece and subsequently reported also from southern Anatolia (Antalya) (Assing 2004b). The specimen from Isparta (section 3.1) was found in a nest of harvester ants (*Messor* sp.) and represents the second record from Turkey.

Astenus sultanicus Assing, 2010

The original description of this very recently described, myrmecophilous species is based on a single male from the Sultan Dağları in Isparta (Assing 2010a). The 92 specimens listed in section 3.1 were found at the type locality, all of them associated with *Tetramorium* sp. (Formicidae).

3.3 Descriptions of new species

3.3.1 Aleocharinae

3.3.1.1 Athetini

Atheta (*Philhygra*) *scabens* **n. sp.**
(Figs. 4–11)

Type material

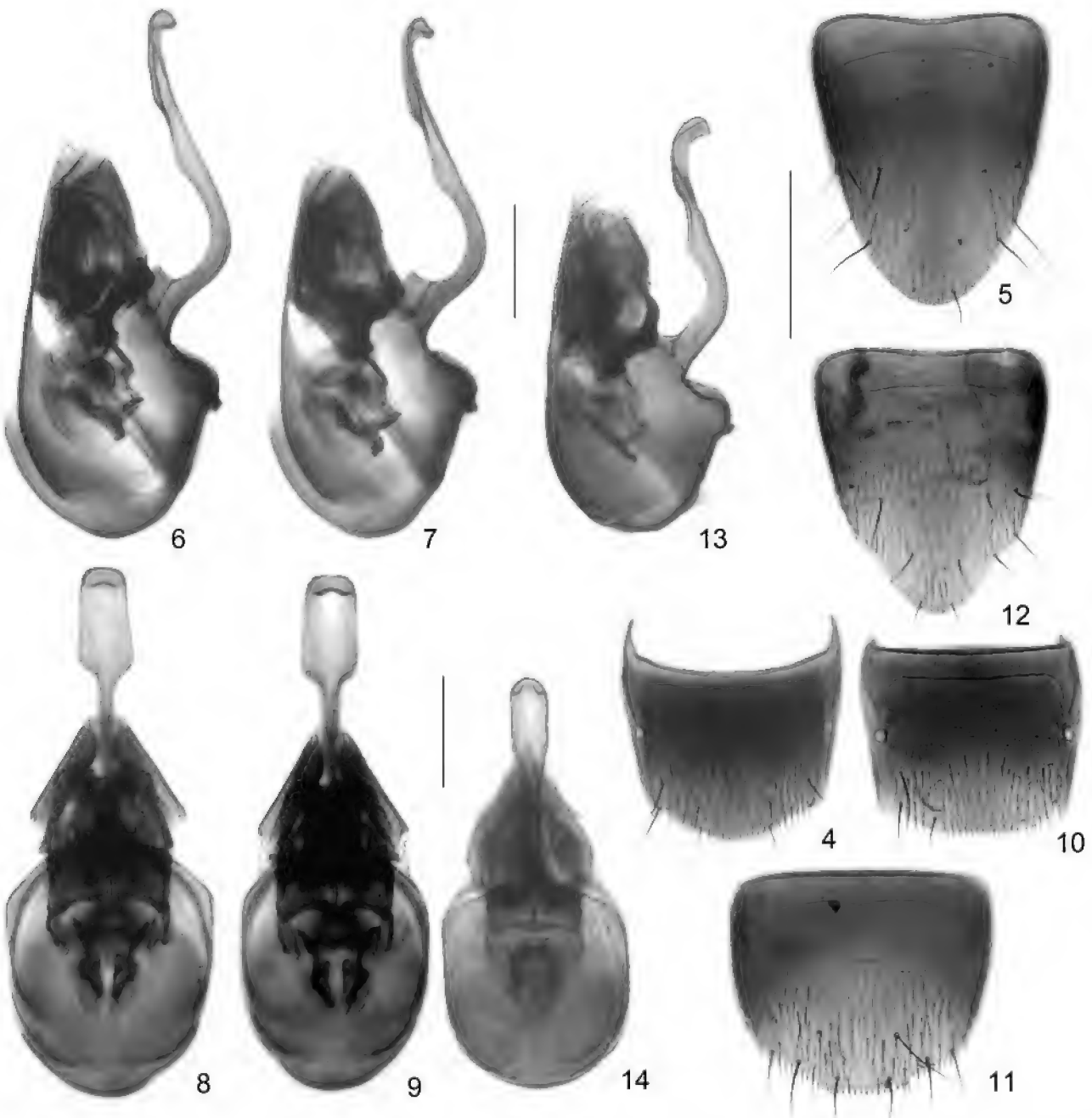
Holotype ♂: "RU [29] – W-Caucasus, 13 km SW Teberda, 1450 m, gravel river bank, 43°20'00"N, 41°39'57"E, 28.VII.2011, V. Assing / Holotypus ♂ *Atheta scabens* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 3♂♂: same data as holotype; 1♂: "RU [19] – W-Caucasus, 4 km NNE Teberda, 1250 m, Teberda river bank, 43°29'20"N, 41°45'23"E, 24.VII.2011, V. Assing" (cAss); 3♂♂, 4♀♀: "Kyrgyzstan/Talass, Tschytschkan-Valley, 15.–16.

VII.2003, 42°07'01N, 72°49'01E, 1700 m, leg. L. SCHMIDT" (cAss); 2 ♀♀: "Kyrgyzstan/Osch, NP Kara Shoro, Uzgenskij Chrebet, 20.VII.2003, 40°43'07N, 73°03'00E, 2900 m, leg. L. SCHMIDT" (cAss); 5 ♂♂, 1 ♀, 6 sex?: "Asia centr. Tadhikist., Pamir Alai, Hissar Mts., Adshuk-Cleft near Warsob, 1200 m, 1.–3.VII.1990, leg. SCHÜLKE & WRASE" (cAss, cSch); 1 ♂: "Tadshikistan, Hissar Alai, Warsob cleft, Rd. to Ansob-pass, km 55, 2000 m, Snowfieldedge [sic], 27.VI.1999, leg. M. SCHÜLKE" (cSch); 1 ♂: "TR [5] – Rize, ca. 50 km SSE Rize, Ovitdağı Geç., 2510 m, under stones, 40°37'31N, 40°45'27E, 25.VII.2006, M. SCHÜLKE" (cSch); 1 ♂: "TR [24a] – Rize, 25 km SSE Rize, 7 km E Ikizdere, 1030 m, river bank, 40°47'01N, 40°38'18E, 31.VII.2006, M. SCHÜLKE" (cAss).

Etymology

The specific epithet is the present participle of the Latin verb scabere and alludes to the shape of the ventral process of the aedeagus, which somewhat resembles a scraper.



Figs. 4–14. *Atheta scabens* n. sp. (4–11) and *A. hygrotopora* (12–14). – **4**. Male tergite VIII. **5**, **12**. Male sternite VIII. **6–7**, **13**. Median lobe of aedeagus in lateral view. **8–9**, **14**. Median lobe of aedeagus in ventral view. **10**. Female tergite VIII. **11**. Female sternite VIII. – Scale bars: 0.5 mm (4–5, 10–12), 0.2 mm (6–9, 13–14).

Description

Body length 4.0–5.4 mm; length of forebody 1.9–2.2 mm. External characters as in *Atheta hygrotopora* (Kraatz, 1856); distinguished only by the primary and secondary sexual characters.

♂: tergite VIII broadly convex posteriorly (Fig. 4); sternite VIII oblong, distinctly longer than tergite VIII, posterior margin convexly produced (Fig. 5); median lobe of aedeagus 0.90–0.95 mm long and with ventral process of distinctive shape (Figs. 6–9).

♀: posterior margin of tergite VIII very weakly convex and in the middle weakly concave (Fig. 10); sternite VIII transverse, posterior margin broadly convex and with stout marginal setae (Fig. 11).

Comparative notes

Based on the similar external morphology, the similar modifications of the male and female terminalia, as well as on the similar morphology of the aedeagus, *A. scabens* is the adelphotaxon of *A. hygrotopora*, from which it is readily distinguished by the different shape of the male sternite VIII (*A. hygrotopora*: more narrowly produced posteriorly; Fig. 12) and by the morphology of the median lobe of the aedeagus (*A. hygrotopora*: smaller, 0.75–0.80 mm long; ventral process apically much less dilated and of different shape; Figs. 13, 14).

Distribution and natural history

Atheta scabens is currently known from northeastern Anatolia, the West Caucasus, Kyrgyzstan, and Tajikistan, which suggests that previous records of *A. hygrotopora* from Turkey, the Caucasus region, and Middle Asia probably refer to this species. Based on the similar habitat requirements and the evidently close relationship of both species, it seems likely that they have allopatric distributions. *Atheta hygrotopora* is widespread in Europe (material from Spain, Italy, Central Europe, and Bosnia-Herzegovina examined).

The type specimens of *A. scabens* were collected on the banks of rivers and streams, from under stones, and near the edge of a snowfield at altitudes of 1030–2900 m.

Atheta brachati **n. sp.**
(Figs. 15–24)

Type material

Holotype ♂: "TR – Bolu (20), Str. Bolu → Kıbrıscık, ca. 25 km s. Bolu, 1580 m, N40°37'59, E31°36'49, 30.IV.2012, leg. Meybohm & Brachat / Holotypus ♂ *Atheta brachati* sp. n. det. V. Assing 2012" (cAss).

Paratype ♂: same data as holotype (cAss).

Etymology

This species is dedicated to Volker Brachat, specialist of Pselaphinae, who collected the type specimens.

Description

Body length 3.2–3.5 mm; length of forebody 1.6–1.7 mm. Habitus as in Fig. 15. Coloration: body black with the posterior portion of the elytral disc diffusely blackish-brown; legs reddish-brown with darker femora; antennae black.

Head (Figs. 16, 17) transverse, approximately 1.1 times as wide as long, narrowed posteriorly immediately behind eyes; punctation fine and rather sparse, somewhat indistinct in the pronounced microreticulation. Eyes larger, nearly twice as long as postocular region in dorsal view. Antennae slender, approximately 1.1 mm long; antennomere III approximately twice as long as broad and slightly shorter than II; IV approximately as long as broad; V–IX weakly transverse and gradually, but weakly increasing in width; X less than 1.5 times as broad as long; XI slightly longer than the combined length of IX and X.

Pronotum (Figs. 16, 18) strongly transverse, approximately 1.3 times as broad as long and 1.25 times as broad as head, maximal width approximately in the middle; punctation fine, dense, and weakly granulose; interstices with pronounced microreticulation and almost matt; pubescence pattern: type II (i. e., pubescence directed caudad along midline and diagonally transversely laterad in lateral portions).

Elytra (Figs. 16, 19) approximately as long as, and distinctly broader than pronotum; punctation dense, moderately fine, and somewhat granulose; interstices with pronounced microreticulation and almost matt. Hind wings fully developed.

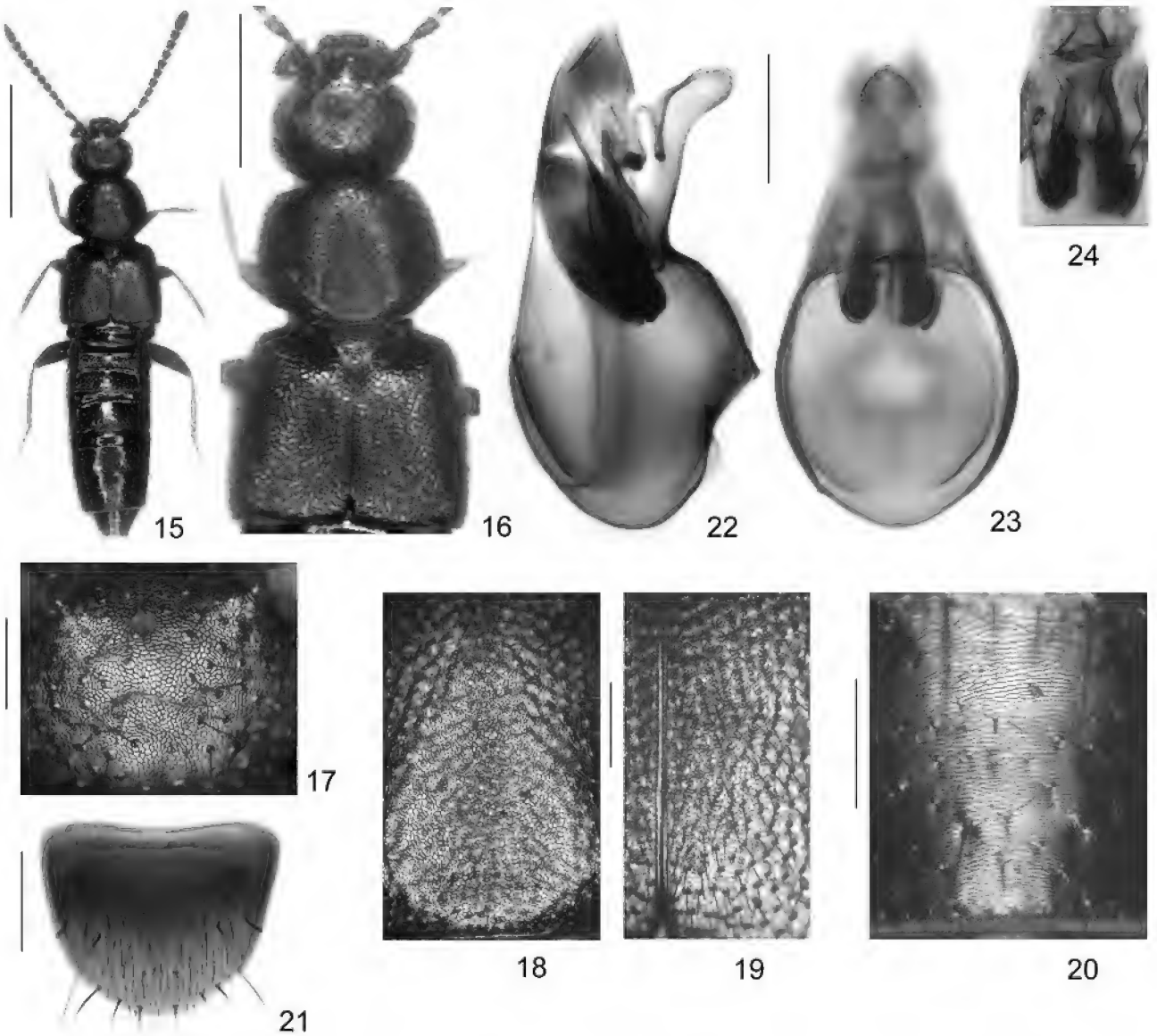
Abdomen distinctly narrower than elytra; punctation fine and moderately dense on tergites III–V, very sparse and shallow on tergites VI–VIII; interstices with fine transverse microsculpture (Fig. 20); posterior margin of tergite VII with palisade fringe.

♂: posterior margin of tergite VIII weakly concave in the middle; sternite VIII transverse, convexly produced posteriorly (Fig. 21); median lobe of aedeagus approximately 0.35 mm long, with ventral process and internal structures of distinctive shape (Figs. 22–24).

♀: unknown.

Comparative notes

Based on the general morphology of the median lobe of the aedeagus, particularly the internal structures, *A. brachati* appears to be related to the species group allied to the widespread *A. vaga* (Heer, 1839) and *A. harwoodi* Williams, 1930. It is distinguished from these species by the more slender antennae, the different shape of the head, the absence of distinct impressions on the male head and



Figs. 15–24. *Atheta brachati* n. sp. – **15**. Habitus. **16**. Forebody. **17**. Median dorsal portion of head. **18**. Median portion of pronotum. **19**. Sutural portion of elytra. **20**. Median portion of male tergite VII. **21**. Male sternite VIII. **22–23**. Median lobe of aedeagus in lateral and in ventral view. **24**. Internal structures of aedeagus in ventral view. – Scale bars: 1.0 mm (15), 0.5 mm (16), 0.2 mm (21), 0.1 mm (17–20, 22–24).

pronotum, the more pronounced and less dense punctation of the pronotum, the different pronotal pubescence pattern, the darker femora, and by the different male primary and secondary sexual characters.

Distribution and natural history

The type locality is situated to the south of Bolu, northwestern Anatolia. The specimens were sifted in grassland near snow either from rotting wood or rotting grass (Brachat, pers. comm.) at an altitude of 1580 m.

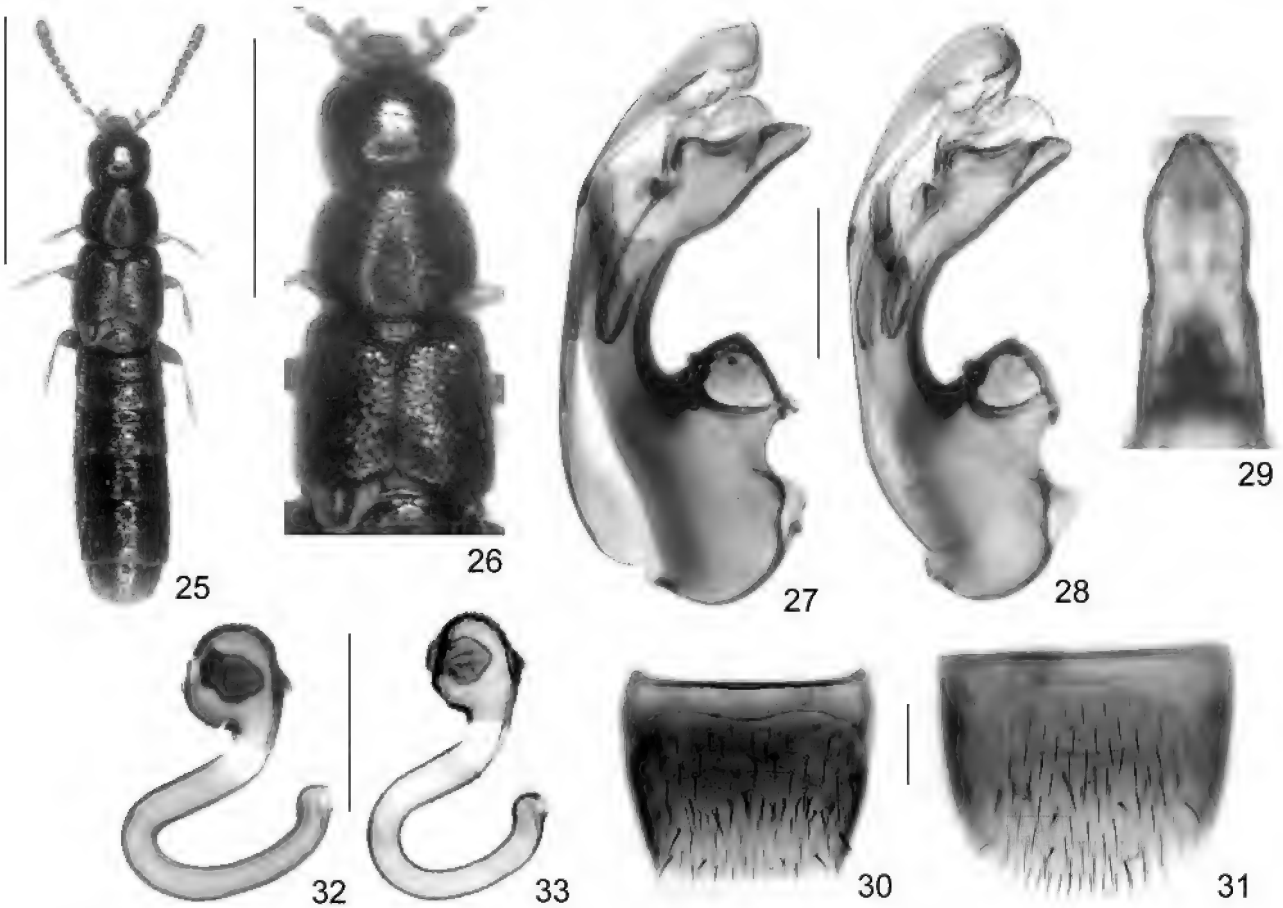
3.3.1.2 Oxypodini

Cousya microdotoides **n. sp.**
(Figs. 25–33)

Type material

Holotype ♂: "N37°26'17 E034°56'09, TR Adana, 1700 m, 16.IV.2011, Brachat & Meybohm (7) / Holotypus ♂ *Cousya microdotoides* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 2♀♀: same data as holotype (cAss); 3♂♂, 1♀: "N37°26'08 E034°54'19, TR Adana Armutolugu, 1220 m, 16.IV.2011, Brachat & Meybohm (5)" (cAss).



Figs. 25–33. *Cousya microdotoides* n. sp. – **25**. Habitus. **26**. Forebody. **27–28**. Median lobe of aedeagus in lateral view. **29**. Ventral process of aedeagus in ventral view. **30**. Female tergite VIII. **31**. Female sternite VIII. **32–33**. Spermatheca. – Scale bars: 1.0 mm (25), 0.5 mm (26), 0.1 mm (27–33).

Etymology

The specific epithet alludes to the external resemblance of this species with species of the subgenus *Microdota* Mulsant & Rey, 1873 (genus *Atheta* Thomson, 1858).

Description

Very small species; body length 1.6–2.2 mm; length of forebody 0.8–1.0 mm. Habitus as in Fig. 25. Coloration: forebody brown to blackish-brown, elytra sometimes slightly paler than head and pronotum; abdomen blackish with reddish-brown apex (posterior margin of segment VII; segments VIII–X); legs yellowish; antennae brown with slightly paler base (antennomeres I and II).

Head (Fig. 26) weakly oblong; punctation shallow and moderately dense, barely noticeable in the pronounced microreticulation; dorsal surface with subdued shine. Eyes moderately convex and moderately large, slightly shorter than postocular region in dorsal view. Antennae short, approximately 0.5 mm long, and incrassate apically; antennomere III much shorter than II, approximately as broad as long and of conical shape; IV–X strongly transverse, approximately twice as wide as long, and of gradually and distinctly increasing width; XI approximately as long as the combined length of IX and X.

Pronotum (Fig. 27) distinctly transverse, approximately 1.25 times as broad as long and 1.25 times as broad as head; posterior angles weakly marked; punctation and microsculpture similar to those of head.

Elytra (Fig. 27) approximately 0.9 times as long as, and slightly broader than pronotum; punctation fine, but more distinct than that of head and pronotum; interstices with pronounced microreticulation. Hind wings reduced to short stubs. Tarsi short; metatarsomere I approximately as long as the combined length of II and III.

Abdomen approximately as broad as elytra, widest at segments VI/VII; tergites III–V anteriorly with, tergite VI without transverse impression; punctation very fine and relatively sparse, barely noticeable in the distinct micro-

sculpture; posterior margin of tergite VII with palisade fringe; posterior margin of tergite VIII broadly convex in both sexes.

♂: posterior margin of sternite VIII broadly convex, not produced in the middle; median lobe of aedeagus 0.32–0.33 mm long, with pronounced crista apicalis (Figs. 27–29).

♀: tergite VIII as in Fig. 30; sternite VIII broadly convex posteriorly, with stout and not particularly dense marginal setae (Fig. 31); spermatheca as in Figs. 32 and 33, of somewhat variable shape.

Comparative notes

In size and habitus, *C. microdotoides* somewhat resembles *C. deminuta* Assing, 2010 from Spain and *C. dimorpha* Assing, 2006 from Greece, but is distinguished from these species particularly by the morphology of the median lobe of the aedeagus (somewhat larger, with more pronounced crista apicalis and with ventral process of different shape). For illustrations of *C. deminuta* and *C. dimorpha* see Assing (2006a, 2010b). All other described species represented in Turkey are separated from *C. microdotoides* by the different habitus (less transverse pronotum, longer elytra, etc.) and larger body size alone.

Distribution and natural history

The species was collected in two localities situated to the northeast of Pozanti in the northwest of Adana province, central southern Anatolia. The reduced hind wings and the absence of previous records from other localities suggest that the distribution of *C. microdotoides* is restricted. The specimens were sifted from leaf litter in mixed cedar and cypress forests (Meybohm, pers. comm.) at altitudes of 1220 and 1700 m.

Meotica wunderlei **n. sp.**
(Figs. 34–43)

Type material

Holotype ♂: "TR [26] – Isparta, 10 km SE Sütçüler, 1520 m, 37°24'55"N, 31°02'21"E, meadow, under stones, 26.IV.2011, leg. Wunderle / Holotypus ♂ *Meotica wunderlei* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 9 exs.: same data as holotype (cAss, cWun).

Etymology

The species is dedicated to my friend and field-trip companion Paul Wunderle, who collected all the type specimens.

Description

Body length 2.0–2.3 mm; length of forebody 0.9–1.0 mm. Habitus as in Fig. 34. Coloration: head and pronotum reddish-brown; elytra yellowish-brown; abdomen brown to dark-brown with the apex (posterior portion of segment VII, segments VIII–X) reddish; legs yellowish; antennae brown with yellowish antennomeres I–III.

Head (Fig. 35) 1.05–1.10 times as broad as long, somewhat wedge-shaped; punctation extremely fine, barely noticeable in the pronounced microreticulation; surface with weak, subdued shine. Eyes small, not projecting from lateral contours of head, little larger than antennomere I in cross-section, and composed of 10–15 ommatidia. Antenna distinctly incrassate apically, approximately 0.5 mm long; antennomere III much shorter than II, approximately as broad as long; IV–X increasingly transverse and of increasing width; X more than twice as broad as long; XI approximately as long as the combined length of IX and X.

Pronotum (Fig. 35) distinctly transverse, approximately 1.25 times as broad as long and 1.1 times as broad as head; posterior angles obtuse and moderately marked; punctation and microsculpture similar to those of head.

Elytra (Fig. 35) approximately as long as pronotum; punctation fine; microsculpture distinct, but less pronounced than that of head and pronotum; surface with subdued, but noticeable shine. Hind wings of reduced length (submacropterous).

Abdomen with pronounced microreticulation and with extremely fine punctation visible only at high magnification; tergite VII with palisade fringe.

♂: tergite VIII moderately transverse with weakly concave posterior margin (Fig. 36); sternite VIII strongly transverse, posterior margin rather broadly convex in the middle (Fig. 37); median lobe of aedeagus approximately 0.28 mm long, shape and internal structures distinctive (Figs. 38, 39); apical lobe of paramere black.

♀: tergite VIII approximately as long as broad and with weakly concave posterior margin (Fig. 40); sternite VIII approximately as long as broad, posterior margin broadly produced in the middle (Fig. 41); spermatheca shaped as in Fig. 42.

Comparative notes

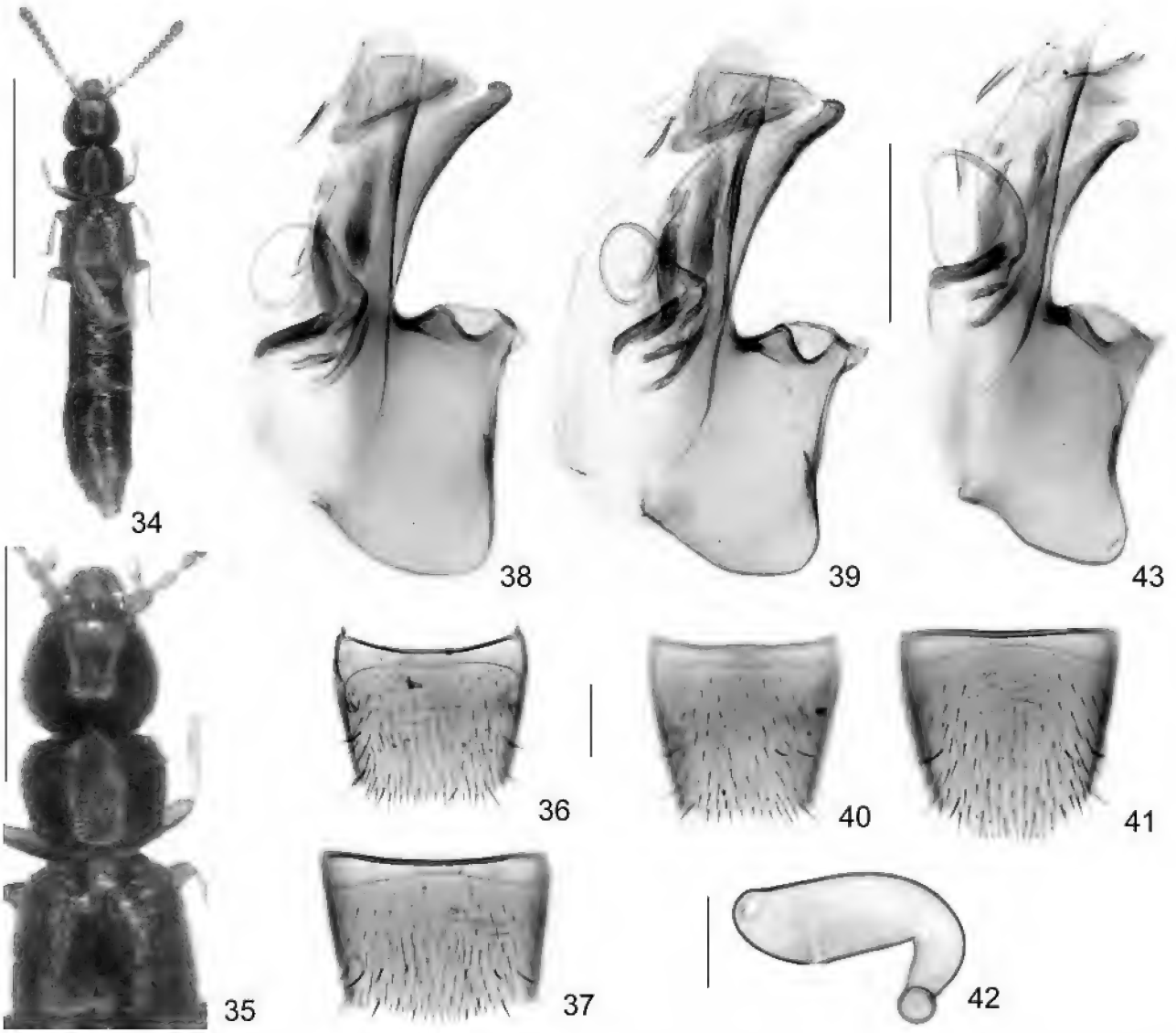
So far, five species of *Meotica* have been recorded from Turkey: *M. decolor* Assing, 2004, *M. hamata* Assing, 2011, *M. marchica* Benick, 1953, *M. subnigra* Assing, 2006, and *M. truncata* Assing, 2004. *Meotica wunderlei* is distinguished from all of them by the shape of the median lobe and of the internal structures of the aedeagus. In addition, it is separated from them as follows:

from *M. decolor* by less pronounced microsculpture on the whole body and by the black apical lobe of the paramere;

from *M. hamata* by paler coloration;

from *M. marchica* by the shape of the posterior margin of the male sternite VIII;

from *M. subnigra* by smaller eyes, paler coloration, the posteriorly more strongly tapering pronotum, and by the shorter elytra;



Figs. 34–43. *Meotica wunderlei* n. sp. (34–42) and *M. marchica* from Kocaeli (43). – **34**. Habitus. **35**. Forebody. **36**. Male tergite VIII. **37**. Male sternite VIII. **38–39**, **43**. Median lobe of aedeagus in lateral view. **40**. Female tergite VIII. **41**. Female sternite VIII. **42**. Spermatheca. – Scale bars: 1.0 mm (34), 0.5 mm (35), 0.1 mm (36–41, 43), 0.05 mm (42).

from *M. truncata* by smaller eyes and the posteriorly convex posterior margin of the male sternite VIII (*M. truncata*: truncate or even weakly concave).

For illustrations of the species described from Turkey see Assing (2004b, 2006b, 2011a); the aedeagus of *M. marchica* is illustrated in Fig. 43.

Distribution and natural history

The type locality is situated to the southeast of Sütçüler in Isparta province, southwestern Anatolia. The specimens were found under large, deeply embedded stones on a moist meadow on calcareous soil at an altitude of 1520 m.

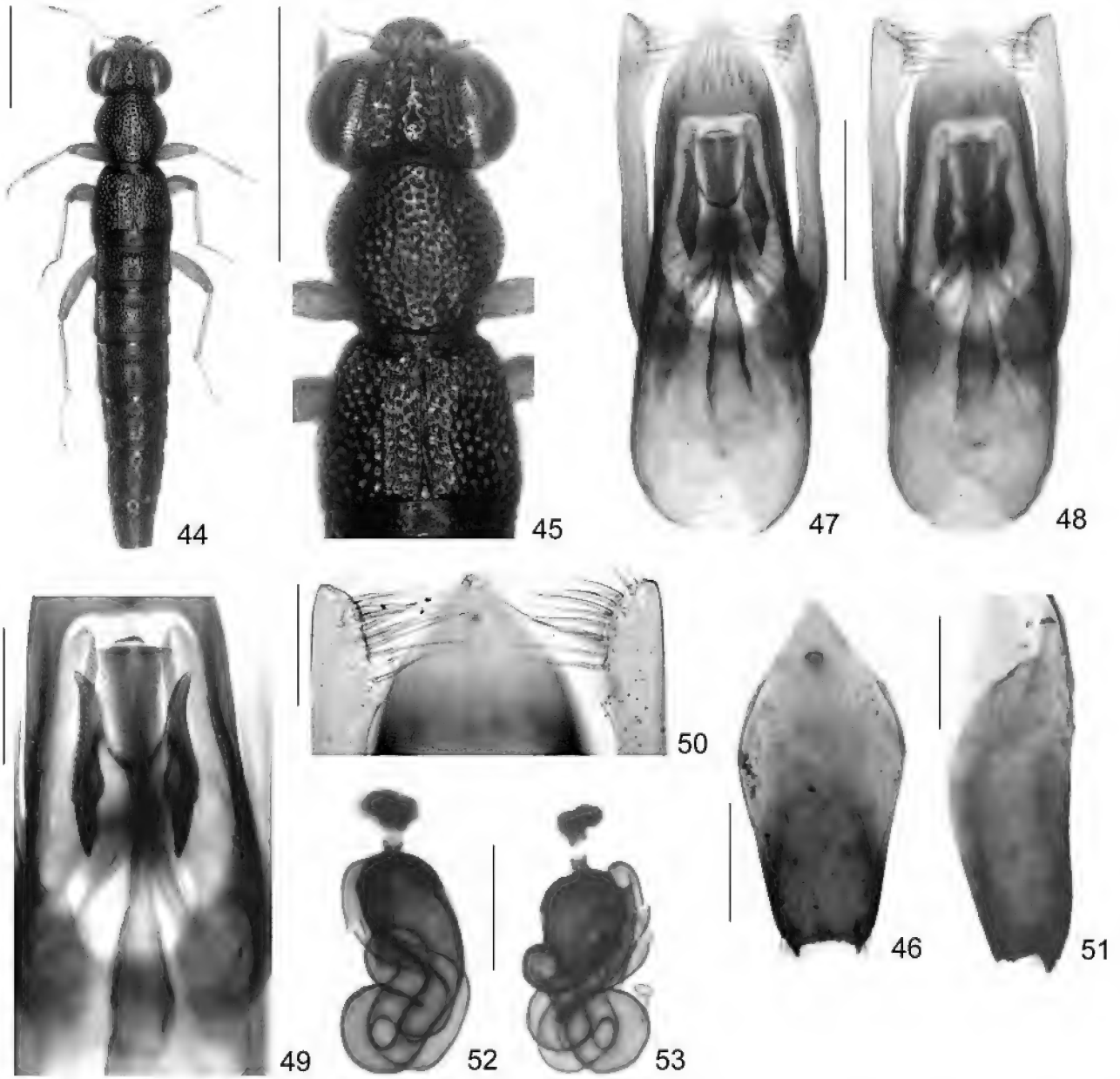
3.3.2 Steninae

Stenus (*Hemistenus*) *bithynicus* **n. sp.**
(Figs. 44–54)

Type material

Holotype ♂: "N40°38'54 E30°05'32, TR Kocaeli 5.V.2012, Kartepe [= Goek Dağı] 1270 m, Brachat & Meybohm (35) / Holotypus ♂ *Stenus bithynicus* sp. n. det. V. Assing 2012" (cAss).

Paratypes: 2♀♀: same data as holotype (cAss); 2♀♀: "TR – Kocaeli (35), Kaltepe [sic] Skizentrum 1270 m, N40°38'54, E30°5'32, 5.V.2012, leg. Meybohm & Brachat" (cAss); 1♀:



Figs. 44–53. *Stenus bithynicus* n. sp. – **44**. Habitus. **45**. Forebody. **46**. Male sternite IX. **47–48**. Aedeagus in ventral view. **49**. Internal structures of aedeagus in ventral view. **50**. Apices of parameres. **51**. Female hemisternite IX. **52–53**. Spermatheca. – Scale bars: 1.0 mm (44–45), 0.2 mm (46–48, 52–53), 0.1 mm (49–51).

"N40°38'47 E30°03'25, TR Kocaeli 25.IV.2012, Pazarcayiri 880 m, Brachat & Meybohm (6)" (cAss); 1 ♀: "TR – Kocaeli (1), SO Suadiye, Kaltepe [sic] 1030 m, N40°39'4, E30°3'42, 24.IV.2012, leg. Meybohm & Brachat" (cAss); 1 ♂: "N40°41'21 E31°08'18, TR Düzce 1.V.2012, Düzce 23 km S 1020 m, Brachat & Meybohm (25)" (cAss); 1 ♀: "TR – Düzce (25), 23 km s. Düzce, 1020 m, N40°41'21, E31°08'18, 1.V.2012, leg. Meybohm & Brachat" (cAss); 1 ♂: "N40°40'21 E30°54'22, TR Sakarya 4.V.2012, Dikmen 4 km S 1275 m, Brachat & Meybohm (32)" (cAss).

Etymology

The specific epithet is an adjective derived from Bithynia, the ancient name of the region where the localities are situated.

Description

Body length 4.0–5.0 mm; length of forebody 1.8–2.1 mm. Habitus as in Fig. 44. Coloration: body blackish, forebody sometimes with weak bronze hue; legs dark-yellowish, with the femoral apices usually weakly infuscate;

antennae yellowish, with the 3–5 apical antennomeres somewhat infuscate.

Head (Fig. 45) dorsally with distinct, densely and coarsely punctured lateral furrows; median keel pronounced, less coarsely and less densely punctate, and with more shine.

Pronotum (Fig. 45) approximately 1.05 times as broad as long and approximately 0.85 times as broad as head across eyes; lateral margins strongly convex in dorsal view; maximal width slightly before middle; punctation coarse and dense; interstices much narrower than diameter of punctures, with or without shallow microreticulation.

Elytra (Fig. 45) short, approximately 0.85 times as long as pronotum, posteriorly dilated; humeral angles almost obsolete; punctation similar to that of pronotum, or coarser and denser; interstices usually with microreticulation. Hind wings completely reduced.

Abdomen with pronounced paratergites, those of segments III–V approximately as broad as maximal width of mesotibia; punctation moderately dense and rather fine; interstices with very shallow to distinct microreticulation; posterior margin of tergite VII with or without indistinct rudiments of a palisade fringe.

♂: metatibia weakly curved in apical third; meso- and metatibia with fine subapical spine; sternite VIII with relatively deep V-shaped posterior excision; sternite IX as in Fig. 46; median lobe of aedeagus 0.63–0.66 mm long and shaped as in Figs. 47–49; parameres stout, apically dilated, furnished with numerous long setae (Fig. 50), and extending slightly beyond apex of median lobe.

♀: meso- and metatibia unmodified; hemitergites IX shaped as in Fig. 51; spermatheca as in Figs. 52 and 53.

Comparative notes

Among the locally endemic and micropterous *Hemistenus* species known from Turkey, *S. bithynicus* is most similar to *S. cilicianus* Assing, 2003 from the Taurus range (region to the north of Alanya). It is distinguished from this species by the on average larger and broader body, the presence of microreticulation on the pronotum, the elytra, and the anterior abdominal tergites (*S. cilicianus*: very shallow microsculpture present only on tergites VII and VIII), the presence of subapical spines on the male meso- and metatibiae, the much deeper and larger posterior excision of the male sternite VIII, the slightly different shape of the aedeagus (parameres apically less strongly dilated), and by the much larger spermatheca. For illustrations of *S. cilicianus* see Assing (2003a).

Distribution and natural history

The species represents the northwesternmost Turkish local endemic of the genus. It is known from several localities in Kocaeli, Sakarya, and Düzce provinces in northwestern Anatolia (Fig. 54). Its discovery came as quite a

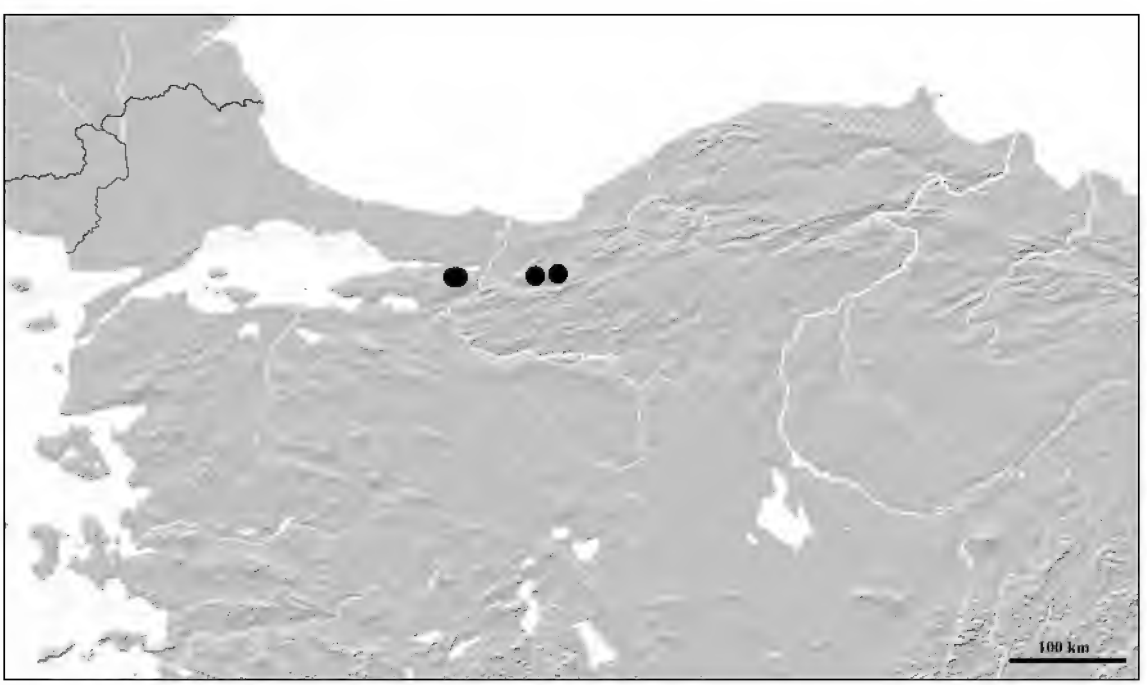


Fig. 54. Distribution of *Stenus bithynicus* n. sp. in northwestern Turkey.

surprise, since the geographically closest north Anatolian, micropterous, and locally endemic *Stenus* species are distributed in Ordu, since endemic Staphylinidae species are generally more widespread in northwestern Anatolia than elsewhere in Turkey, and finally since the region has repeatedly been visited by coleopterists before. The specimens were sifted from leaf litter in beech forests, partly with rhododendron undergrowth, in a hornbeam forest with rhododendron undergrowth, and in a mixed fir and beech forest at altitudes of 880–1270 m (Meybohm, pers. comm.).

4 Remarks on a recent catalogue of the Staphylinidae of Asia Minor and Cyprus

Catalogues can be most useful tools not only for taxonomists, but also for zoogeographic and ecological studies, since they compile information often scattered in the literature. Up until about a decade ago, the Turkish staphylinid fauna had been very poorly studied and addressed primarily in the context of species descriptions, of taxonomic revisions of certain taxa, or of identification keys and faunistic synopses not specifically dealing with the fauna of Turkey. In recent years, however, numerous articles addressing the Staphylinidae of Turkey have been published (see section 5), including descriptions of several hundred new species and even more new country records. Against this background, a comprehensive, critically reviewed, and up-to-date catalogue compiled by a taxonomist with a profound knowledge both of Turkey and the Staphylinidae could provide a state-of-the-art overview. A first attempt was made by Anlaş (2009), who published a checklist of all the Staphylinidae described and recorded from Turkish territory, indicated the respective provinces, and provided a nearly complete bibliography.

More recently, Bordoni (2010) published a catalogue of the Staphylinidae of Asia Minor and Cyprus "in the hope of contributing to better knowledge of Staphylinidae of one of the most interesting zoogeographical area of the Mediterranean" [sic]. The author has published numerous taxonomic articles, particularly on Xantholinini, as well as on some groups of West Palaearctic Paederinae, Staphylininae, and Omaliinae. It can be inferred from the material list, however, that he has never personally collected Staphylinidae in Turkey. The catalogue comprises more than 300 pages with a two-page introduction, a list of "acronims" [sic], a list of taxa, an acknowledgements section, a summary, and a bibliography.

A reader hoping for a state-of-the-art synopsis of the Turkish staphylinid fauna, however, will be rather disappointed. A closer look raises considerable doubts regarding the scientific value of this paper. True, it is almost impossible to write a comprehensive work without mistakes and errors, but the shortcomings of the catalogue in question are so numerous, so various, and so significant that it seems somewhat surprising that it ever got past an editor. Needless to say that it was evidently published without serious peer-reviewing.

The Scaphidiinae, Pselaphinae, Scydmaeninae, and Dasycerinae, formerly separate families, but now subfamilies of Staphylinidae are omitted. Nowhere in the catalogue does Bordoni mention that, or why, these subfamlies were not included. The data for the individual species are more or less copied from the primary sources. They are neither discussed nor evaluated, and hardly any new data are given. Instead of providing a complete bibliography, the reader is referred to the standard catalogues by Herman (2001) and Smetana (2004) for part of the literature references.

Although the said catalogue was published as late as 2010, only data and references published before 2008 are considered, which rendered it hopelessly incomplete at the time of publication. Not only had at least 34 species been described and at least 40 additional species newly recorded from Turkey in 2008 and 2009 alone. Also, numerous new generic and subgeneric assignments, as well as new synonymies affecting the Turkish fauna had been established, and misidentifications had been rectified during this period. Moreover, it is particularly surprising that there is no reference whatsoever to the checklist of Turkish Staphylinidae published by Anlaş (2009), which Bordoni knew about and which, though not faultless, is significantly more correct, more comprehensive and complete (also regarding the bibliography), more detailed, more up-to-date, and more informative. Unlike Bordoni, Anlaş had sent parts of his checklist to various specialists for correction, critical review, and completion.

In the acknowledgements section, the author "wishes to thank for their kind cooperation [numerous] colleagues [sic]", including myself. I am not aware, however, of having contributed anything to this book other than the publications listed in the bibliography section. The same is true of at least part of the other colleagues mentioned in this section. None of those that I have asked remembers any contribution.

The catalogue is subject to numerous formal shortcomings. It contains many hundreds, if not thousands, of linguistic errors (grammar, spelling, etc.), particularly in the introduction, but also in other parts of the catalogue. Turkish special characters are not given at all "for pratical [sic] reasons" (what may these reasons be in an age where every text processor provides such characters?). Writing "Ardesen" rather than "Ardeşen" (example given in the introduction of the catalogue) would be equivalent to omitting accent marks in French or leaving out the "h" in macchia. Moreover, the omission of diacritic marks and the substitution of special characters with standard letters is not confined to Turkish localities, but also affects names of authors, as well as colleagues mentioned in the acknowl-

edgement section, e. g., "HLAVAC" rather than HLAVÁČ. The map of "Turkey" (p. 36) only depicts the Asian part of Turkey; the European part is omitted. The species are listed by subfamilies. However, the arrangement of genera within the subfamilies is partly somewhat confusing. For instance, the genus *Plataraea* is separated from other Athetini and appears only at the very end of the catalogue, right after the Aleocharini.

The distribution sections contain very little zoogeographic information. Some species recorded also from outside Turkey are categorised simply as "widespread". Species recorded only from Turkey (or Cyprus) are given as "endemic" (endemic to what region?) without further specification. Turkey is zoogeographically highly diverse and there is not a single species that is distributed in all Turkish regions, but absent from any of the adjacent countries. Often, the general distribution sections are remarkably incomplete (see, e. g., *Medon rufiventris*; p. 124) or incorrect. In most cases, the zoogeographic data provided in the standard catalogues by HERMAN (2001) and SMETANA (2004) are significantly more informative. Turkish localities are often not specified, apparently because the primary records had not been found in the literature. They are neither standardised nor arranged systematically (e. g., by province), and they are subject to innumerable misspellings or other errors. In the case of *Atrecus parvioculatus* (p. 162), for instance, the collector is given as the locality.

Several species are erroneously listed for Turkey, based on evident misidentification, misinterpretation, or because relevant literature was either neglected or overlooked: e. g., *Diochus libanoticus*, *Mycetoporus niger*, *M. nigricollis*, *M. solidicornis*, *Tachinus flavolimbatus*, *Myrmecopora pygmaea*, and *Amarochara forticornis*. In addition, numerous doubtful records (most likely based on misidentifications) are reported; only some of them are classified as "to be confirmed".

The catalogue is also subject to numerous taxonomic and nomenclatural errors, for instance, misspelled scientific names (e. g., *Omalium saulcy*, *Diochus atayus*, *Typhodes*, *Microsauarus*, *Atheta chefssurica*, *A. cinammoptera*, *A. pittioni*), missing parentheses (see, e. g., the author of *Pella erratica*), omitted generic names (e. g., [*Myrmecopora*] *wunderlei*, [*Derocala*] *brachati*. Also, invalid genus-group names are used (e. g., *Ditroposipalia*, *Glossola*).

In several cases, one and the same species is erroneously listed twice (as valid) under different names, occasionally even in different genera or tribes, e. g. (valid name or combination given first) *Tachinus rufipes* and *T. signatus*; *Liogluta alpestris* and *L. nitidula*; *Geostiba oertzeni* (Athetini) and *Leptusa solitaria* (synonym of *G. oertzeni*; *Leptusa* belongs to Homalotini!); *Aloconota* (s. str.) *gregaria* and *Atheta* (*Glossola*, sic!) *gregaria*; *Nehemitropia lividipennis* and *Atheta sordida*; *Atheta clientula* and *Acrotona clientula*. Furthermore, some generic (e. g., *Leptusa solitaria*, *Falagrioma pamphylica*, *Aleochara alata*, *A. cingulata*) and subgeneric assignments (e. g., *Geostiba attaleensis*, *G. bigibbera*, *G. kastamonuensis*, *G. occaecata*, *Atheta clientula*, *A. mucronata*, *Oxypoda cristata*, *O. flavocaudata*, *O. speculoclara)* are incorrect. Synonymies are given inconsistently, sometimes with, often without the original reference to the author of the respective synonymy.

One of the foremost objectives and principles of the Code (ICZN 1999) is the stability of nomenclature. In his catalogue, BORDONI proposes as many as thirteen new synonymies without presenting any arguments whatsoever. Instead he states that they "will be dealt with elsewhere" (p. 36). Remarkably, most of these synonymies are proposed in genera that the author has never published a single taxonomic article about and evidently has very little personal experience with (*Leptusa* Kraatz, 1856 and *Geostiba* Thomson, 1858). None of these synonymies is based on the study of type (or other) material of the synonymised names. What is more, in most cases the author probably has not even seen material of what he proposes as the senior name. If these synonymies are not based on research and study, what then are they based on? In any case, minimum scientific requirements and standards are not met, so that the synonymies would be unacceptable for these reasons alone.

Furthermore, the majority of the synomymies are rather bizarre, since the respective species pairs are not even particularly similar and even entomologists without much expertise in staphylinid taxonomy would realise at once that they represent distinct species if only they compared actual specimens or carefully looked at the descriptions and illustrations of sexual characters. Without exception, the below synonymies proposed by BORDONI are incorrect. The respective synonyms were all treated in the context of comprehensive taxonomic revisions (ASSING 2003c, 2004c, 2007a, 2007c, 2007d, 2009f). All of them represent distinct and valid species, so that they are here formally revalidated:

Medon lanugo Assing, 2004 [not synonym of *M. lydicus* Bordoni, 1980];

Medon reliquus Assing, 2007 [not synonym of *M. maronitus* (Saulcy, 1865)];

Medon subquadratus Assing, 2004 [not synonym of *M. seleucus* Bordoni, 1980];

Xantholinus penicillatus Assing, 2007 [not synonym of *X. puthzi* Bordoni, 1979];

Leptusa longilobata Assing, 2007 [not synonym of *L. fibula* Assing, 2003];

Leptusa artviniensis Pace, 1982 [not synonym of *L. ionopolitana* Pace, 1982];

Leptusa amisensis Pace, 1982 [not synonym of *L. ionopolitana* Pace, 1982];

Leptusa diecki Pace, 1983 [not synonym of *L. paphlagonica* Pace, 1982];

Leptusa spoliata Assing, 2002 [not synonym of *L. paphlagonica* Pace, 1982];
Geostiba lycaonica Pace, 2002 [not synonym of *G. uhligi* Pace, 1983].

Likewise, the three synonymies listed below are erroneous:

Leptusa confinis Pace, 1982 [of *L. paphlagonica* Pace, 1982];
Leptusa othmaniorum Pace, 1983 [of *L. paphlagonica* Pace, 1982];
Leptusa gurgentepensis Pace, 1989 [of *L. paphlagonica* Pace, 1982].

According to Assing (2009d), the first revising author, the correct synonymies are as follows: *Leptusa confinis* Pace, 1982 = *L. paphlagonica* Pace, 1982 (syn.), = *L. othmaniorum* Pace, 1983 (syn.); *Leptusa diecki* Pace, 1983 = *L. gurgentepensis* Pace, 1989 (syn.).

According to Bordoni, "it believe that it can serve as a basis for further study of the Staphylinidae of Cyprus and Asia Minor, areas where in recent years has focused the attention of some scholars that researche continues [sic]". In view of the significant shortcomings outlined above, however, it appears rather unlikely that this substandard catalogue will indeed prove to be a useful tool. If a synopsis of Turkish Staphylinidae is needed, the checklist by Anlaş (2009) will undoubtedly be the better choice.

5 References

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Revision of the genus *Amarygmus* Dalman and related genera. LXV. The Amarygmini of the Philippines (Coleoptera: Tenebrionidae), part II

Hans J. Bremer

Abstract

Annotations are made on the genus *Lobatopezus* Pic, 1952. The following new species of Amarygmini from the Philippines are described and illustrated: *Lobatopezus schawalleri* **n. sp.** (Catanduanes), *Amarygmus subopacus* **n. sp.** (Catanduanes), *A. hesperus* **n. sp.** (Leyte), *A. illex* **n. sp.** (Leyte), and *A. pyritidis* **n. sp.** (Mindanao).

Keywords: Coleoptera, Tenebrionidae, Amarygmini, *Amarygmus*, *Lobatopezus*, Philippines, new species.

Zusammenfassung

Zu der Gattung *Lobatopezus* Pic, 1952 werden einige Anmerkungen gemacht. Die folgenden neuen Amarygmini-Arten werden beschrieben und abgebildet: *Lobatopezus schawalleri* **n. sp.** (Catanduanes), *Amarygmus subopacus* **n. sp.** (Catanduanes), *A. hesperus* **n. sp.** (Leyte), *A. illex* **n. sp.** (Leyte) und *A. pyritidis* **n. sp.** (Mindanao).

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1 Introduction

A revision of the Philippine Amarygmini was published by Bremer (2009a). 50 species are currently known of *Amarygmus* Dalman, 1823, two species of *Dalmanius* Bremer, 2001, one species of *Caudamarygmus* Bremer, 2001, one species of *Luzonoplonyx* Bremer, 2009, one species of *Euspinamarygmus* Masumoto, 1989, and one species of *Lobatopezus* Pic, 1952. Recently I received new material for identification, among them one new species of *Lobatopezus* and four new species of *Amarygmus*. These species are described and illustrated in the present paper.

The genus *Lobatopezus* Pic, 1952 was not treated by Bremer (2009a) because no type material was found in the Muséum d'Histoire Naturelle in Paris, and additional specimens or species of this genus were unknown to me. The newly collected specimen of *Lobatopezus* makes it possible to give more details for this genus.

Abbreviations of depositories

CA Collection of the Entomological Laboratory of Dr. Kiyoshi Ando, Osaka, Japan
NHMB Naturhistorisches Museum, Basel, Switzerland
SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany
ZSM Zoologische Staatssammlung, München, Germany

Acknowledgements

For the loan or gift of material I thank the following colleagues: Dr. K. Ando (Osaka), Dr. W. Schawaller (Stuttgart), and Dr. E. Sprecher (Basel). Thanks are extended to F. Forman (Schledehausen), who prepared the figures of this paper, and to Dr. R. Grimm (Neuenbürg) and Dr. W. Schawaller for the review of the manuscript.

2 Methods

Morphometry

"Body length" represents the distance between the middle of anterior edge of the pronotum and the apices of elytra, "body width" the maximum width across the elytra, "length of elytra" the distance between the base of the scutellum and the apices of the elytra (measured in dorsal view), "length of pronotum" the distance between the middle of their anterior and posterior edges (measured in the plain through these points).

Data on the labels

The data on the labels are given in the original language and with the abbreviations as used by the collectors.

3 Annotations on the genus *Lobatopezus* Pic, 1952

According to Pic's (1952) description of the genus *Lobatopezus* (type species *Lobatopezus diversecostatus* Pic,

1952) it is "voisin de *Spathulipezus* Geb., avec les articles des tarses antérieurs large, le penultième étant profondément incisé et largement bilobé. Un caractère spécial semble devoir distinguer le genre, celui des stries laterals irrégulieres aux élytres en partie interrompues près des épaules …". *Spathulipezus* Gebien, 1920 is a monotypic genus of Amarygmini from the island of Bougainville of the Solomon Islands. It has two tarsomeres on pro- and mesotarsomeres and one tarsomere on the metatarsomeres which are not apically linked to the preceding tarsomere, but dorsally. The respective tarsomeres appear to be bilobed at low magnification. All Amarygmini, except *Spathulipezus* Gebien and *Lobatopezus* Pic, have tarsomeres which are connected to the preceding ones at the apical position.

In *Spathulipezus* (type species *Spathulipezus miritarsis* Gebien, 1920) pro- and mesotarsomeres 1 are rather wide, pro- and mesotarsomeres 2+3 are also rather wide and prolonged apically, pro- and mesotarsomeres 3+4 are linked on the upperside to the preceding tarsomeres, protarsomere 4 is tiny and barely visible, mesotarsomere 4 is also small but less tiny than protarsomere 4, pro- and mesotarsomeres 5 are linked to the preceding tarsomeres at the normal apical point. Metatarsomere 1 is long, metatarsomere 2 is widely enlarged and prolonged apically, linked to metatarsomere 1 at the normal apical point, metatarsomere 3 is linked to metatarsomere 2 on its upperside, metatarsomere 4 is connected to metatarsomere 3 at the apex. Habitus and tarsomeres of *Spathulipezus miritarsis* are figured in Bremer (2009b: fig. 19A).

Below I describe a new species from the Philippines which probably belongs to *Lobatopezus* because of the following reasons: Pic's statement that the tarsomeres of his genus resemble those of *Spathulipezus*, the lack of this special form of tarsomeres in other genera of the Amarygmini, and the presence of both, *Lobatopezus diversecostatus* and the new species, on the Philippines. However, the assignment of the newly described species to *Lobatopezus* remains tentatively because I could not yet study the type of *Lobatopezus diversecostatus*.

If the tarsomeres of *Lobatopezus schawalleri* n. sp. (the new species described below) are examined in lateral view at high magnification (dorsal view shown in Fig. 1A), the following characters become obvious: pro- and mesotarsomeres 2 are linked to tarsomeres 1 at their apical position, pro- and mesotarsomeres 3 are prolonged apically, pro- and mesotarsomeres 4 are very small and linked to the upperside of tarsomeres 3. Metatarsomere 2 is prolonged apically, metatarsomere 3 is tiny and linked to the upperside of metatarsomere 2, metatarsomere 4 is linked to metatarsomere 3 at its apical position. The linking of the tarsomeres is difficult to study because of the brush-like pilosity of the soles. This structure, viewed at low magnification, might give the impression that the tarsomeres are partially divided into two halves ("bilobé"). There are differences between *Spathulipezus* and *Lobatopezus* concerning the number of tarsomeres with an insertion on the upperside and the shape of the tarsomeres. Therefore, both genera should remain separated.

4 Descriptions of new species

Lobatopezus schawalleri **n. sp.**
(Fig. 1A–J)

Holotype (♂): Philippines, Catanduanes, Gigmoto-Nahlug falls, 7.III.2007, leg. E. Colonnelli (SMNS).

Etymology

Schawalleri = dedicated to Dr. Wolfgang Schawaller (Stuttgart), honouring his friendly and constructive cooperation over years.

Diagnosis

Body shape wide, oval; of medium size; maximum width at the first third of elytra; elytra with rows of medium-sized, closely set punctures and flat intervals on disc; the rows of punctures do not reach the elytral base at the shoulders. Characters of tarsomeres see chapter 3.

Lobatopezus diversecostatus Pic, 1952, the only described species of this genus, known from Mindanao, is smaller (body length 6 mm) than *L. schawalleri* n. sp. and has irregular and partly interrupted striae (*L. schawalleri* has regular rows of punctures on the elytra).

Description

Measurements: Body length: 8.83 mm. Body width: 5.57 mm. – Ratios: Pronotum: Width/length 2.08; width hind corners/width front corners 2.13. Elytra: length/width 1.33; length elytra/length pronotum 3.88; maximum width elytra/maximum width pronotum 1.40.

Colouration: Upperside coppery, moderately lustrous; clypeus and genae lighter brown. Underside dark brown. Legs and antennae lighter brown than upper- and underside.

Head: Upperside relatively flat, genae slightly raised towards their lateral margins. Frons of medium width, nearly as wide as length of antennomere 3 (like 23 : 26), covered with small, somewhat irregularly set punctures. Genae less closely punctured than frons, anteriorly terminating in front of the fronto-clypeal suture. Fronto-clypeal suture slightly incised in the middle. Clypeus moderately protruded forwards, slightly convex longitudinally, nearly flat transversely, punctured as on frons. Mentum widened anteriorly, with somewhat bent sides, transition between sides and base rounded; with flat, lustrous lateral margins; space in between less lustrous, convex transversely, with

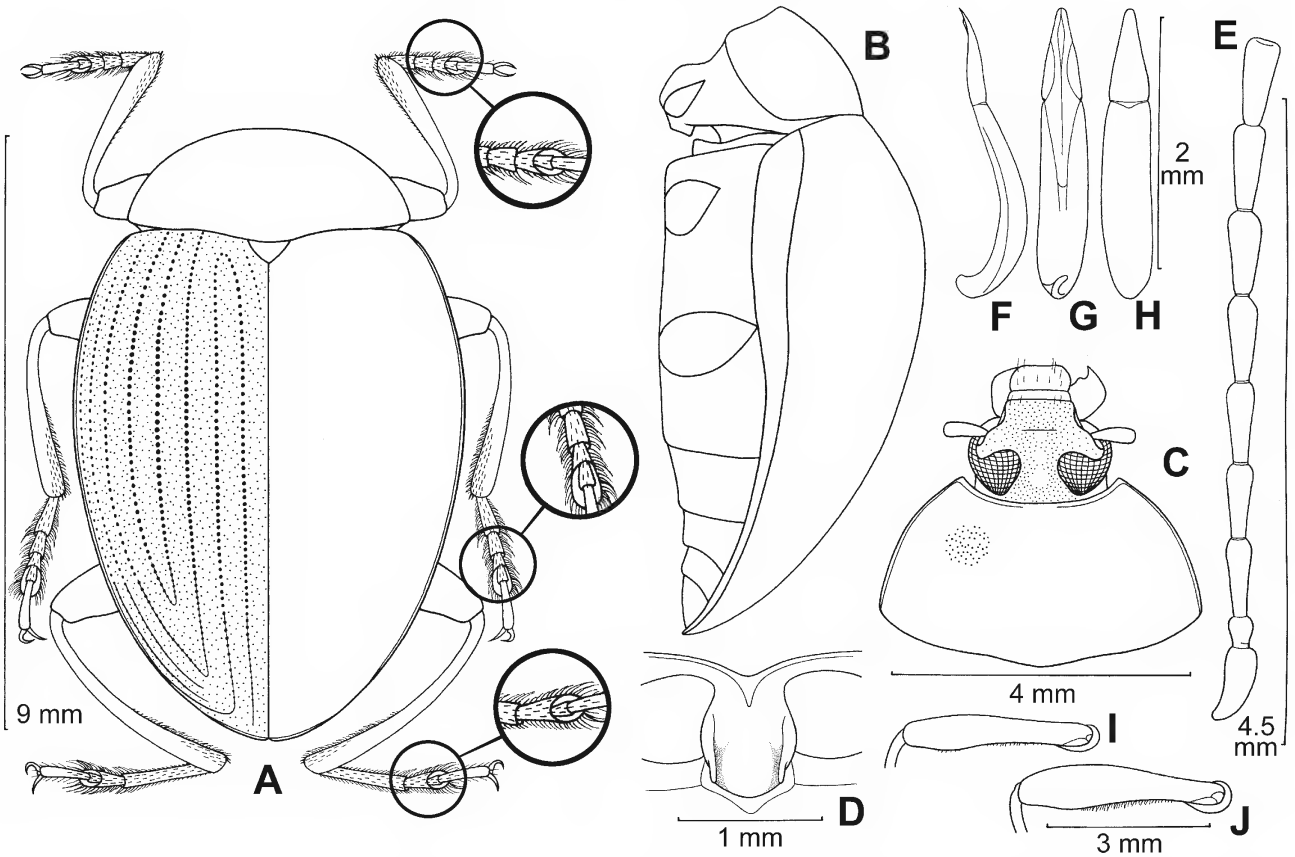

Fig. 1. *Lobatopezus schawalleri* n. sp. – **A** Habitus. **B** Body, lateral view. **C** Head and pronotum. **D** Prosternal apophysis. **E** Antennomeres 1–9. **F** Aedeagus, lateral view. **G** Aedeagus ventral view. **H** Aedeagus, dorsal view. **I** Mesofemur. **J** Metafemur.

a few small punctures and short hairs. Underside of neck with small punctures with short erect hairs. Mandibles with a longitudinal sulcus on outer surface, apically bifid.

Pronotum: Rather flat. Slightly convex transversely and longitudinally. Widest at base, anteriorly narrowing, sides nearly straight in posterior half, bent in anterior half. Front corners in dorsal view sharply angled, angle about 80°; hind corners angular, obtuse. Anterior margin markedly excavated. Posterior margin not bordered. Lateral and anterior margins bordered. Lateral borders in dorsal view well visible on their whole length. Front corners in lateral view sharp-angled, with an angle of about 90°; hind corners very obtuse, nearly rounded. Surface with distinct, small, relatively closely set punctures, leaving a median longitudinal area without punctures.

Scutellum: Triangular, impunctate.

Elytra: Wide, oval, moderately convex transversely and longitudinally. Maximum width and height at the anterior third. Shoulders not prominent. Apices of elytra mutually rounded. Lateral edges in dorsal view narrowly visible on the whole length. Surface with rows of medium-sized, closely set punctures which are slightly impressed; distance between punctures on disc in row 4 less than the diameter of a puncture; about 60 punctures in row 4; rows 7 and 8 do not reach the elytral base. Intervals on disc flat, slightly convex laterally; with minute, distinct, relatively closely set punctures.

Prosternum: Anterior margin continuously bent upwards, with a short keel towards apophysis in the middle. Apophysis relatively flat, nearly oval, widest between procoxae where its lateral margins are slightly lifted; apex widely pointed.

Mesosternum: Anterior part depressed, with a lustrous median clasp. Anterior margin of posterior part deeply excavated in the middle; posterior part longitudinally sulcated on each side.

Metasternum: Anterior margin between mesocoxae rounded, bordered. Disc with closely set punctures of medium size and short stout hairs originating from these punctures. Median line shallowly depressed in its posterior half.

Sternites: Anterior margin of sternite 1 between metacoxae ogival, broadly bordered. Disc of sternite 1 punctured as metasternum; disc of sternite 2 only with small punctures; sternites 3–5 with tiny, widely separated punctures. Sternite 5 apically shallowly depressed.

Antennae: Of medium length. Length/width ratio of antennomeres 1–9 equals to 12:5½ / 4½:4 / 13:4 / 13:4 / 14:4 / 13:5 / 14:5 / 14:5 / 15:5 (antennomeres 10 + 11 missing).

Legs: Short. Femora thickened towards the second third, with closely set, small punctures; profemur without any tooth or interruption anteriorly; meso- and metafemora with short, closely set hairs posteriorly. Protibia slightly concave on outer side, somewhat broadened anteriorly on inner side; mesotibia moderately bent in basal two-fifths, straight in apical three-fifths, with oblique, closely set hairs of medium length in the apical half on inner side. Metatibia relatively thin, moderately bent. Characters of tarsomeres see above (chapter 3). Lengths of protarsomeres 1–5 as 9:6:6:4:16; lengths of mesotarsomeres 1–5 as 15:13:5:3:11; lengths of metatarsomeres 1–4 as 27:9:3:16 (measured in dorsal view).

Aedeagus: See Fig. 1F–H.

Amarygmus subopacus **n. sp.**
(Fig. 2A–E)

Holotype (♀): Philippines, Catanduanes, near Bato, 13°36'57"N 124°17'49"E, 10.III.2007, E. Meloni leg. (SMNS).

Paratypes: Same data as holotype, but E. Colonnelli leg. (1 ♀ ZSM; 1 sex not determined, head missing, SMNS).

Etymology

Subopacus (Lat.) = somewhat opaque.

Diagnosis

Relatively small; elongate oval. Elytra with rows of small punctures which are inconstantly linked by faint lines; elytral intervals flat on disc, somewhat convex laterally. Pronotal punctures widely separated and indistinct. Frons of medium width. Antennae not very long. Metatarsomere 1 very long. Upperside moderately opaque, dark brown, lateral and apical parts with some faint iridescence.

The new species keys out at couplet 14 of Bremer's (2009a) key (*Amarygmus prolixus* Bremer, 2009, *Amarygmus iuventus* Bremer, 2009). Both species are only known from Luzon.

Amarygmus prolixus is smaller on average (body length 4.36–5.33 mm), and the punctures of the elytral rows are somewhat larger, but it has similarly long elytra, a similarly wide frons and also tiny, inconspicuous punctures on the pronotum. *A. subopacus* is possibly only a subspecies of *A. prolixus*.

Amarygmus iuventus is clearly iridescent on pronotum and elytra and its frons is narrower. Body length (5.73–6.09 mm) and length/width ratio of elytra equal that of *A. subopacus*.

Description

Measurements: Body length: 5.33–6.13 mm. Body width: 2.84–3.18 mm. – Ratios: Pronotum: width/length 1.68–1.70; width hind corners/width front corners 1.65–1.74. Elytra: length/width 1.50–1.58; length elytra/length pronotum 3.66–3.83; maximum width elytra/maximum width pronotum 1.29–1.30.

Colouration: Upperside see Diagnosis, slightly microreticulated. Underside dark brown to black. Lateral parts of pronotum in lateral view with faint blue iridescence. Head nearly black, microreticulated. Legs dark brown. Antennae dark brown to black.

Head: Frons of medium width, distinctly wider than length of antennomere 3 (like 22 : 11) with tiny, widely separated punctures. Genae slightly raised, anteriorly terminating in front of the level of the fronto-clypeal suture. Fronto-clypeal suture slightly incised in the middle. Clypeus moderately protruded forwards, nearly flat; with tiny, widely separated punctures. Mandibles with a longitudinal sulcus on outer surface, apically bifid.

Pronotum: Relatively narrow; moderately convex transversely, slightly convex longitudinally. Widest at base, anteriorly narrowing and bent. Front corners in dorsal view indistinctly rounded; hind corners indistinctly angular, obtuse. Anterior margin slightly excavated. Lateral and anterior margins bordered. Lateral borders in dorsal view very narrowly visible. Front corners in lateral view rounded, obtuse; hind corners angular, obtuse. Surface see Diagnosis.

Scutellum: Triangular, impunctate.

Elytra: Elongate oval, moderately convex transversely and longitudinally. Maximum width and height at the end of the anterior third. Shoulders rounded. Apices of elytra mutually rounded. Lateral edges in dorsal view narrowly visible in posterior half. Surface with rows of small to medium-sized punctures which are inconstantly connected by faint lines, apically and laterally situated in somewhat incised striae; distance between punctures on disc in row 4 about 1½ diameters of a puncture; about 23 punctures in row 4. Intervals with tiny, widely separated, inconspicuous punctures.

Prosternum: Anterior margin narrowly bent upwards, terminating in a triangular process in the middle which is continuing into a flat, median keel on the ground of the apophysis. Apophysis not very wide, somewhat widened along procoxae and its lateral margins somewhat raised; in between with a median groove. Behind procoxae the lateral margins are narrowing; apically the apophysis is rounded.

Mesosternum: Hind part rather long and narrow, with a narrow longitudinal sulcus on each side; anterior margin of hind part excavated in the middle.

Metasternum: Anterior margin between mesocoxae rounded, bordered. Surface microreticulated, nearly im-

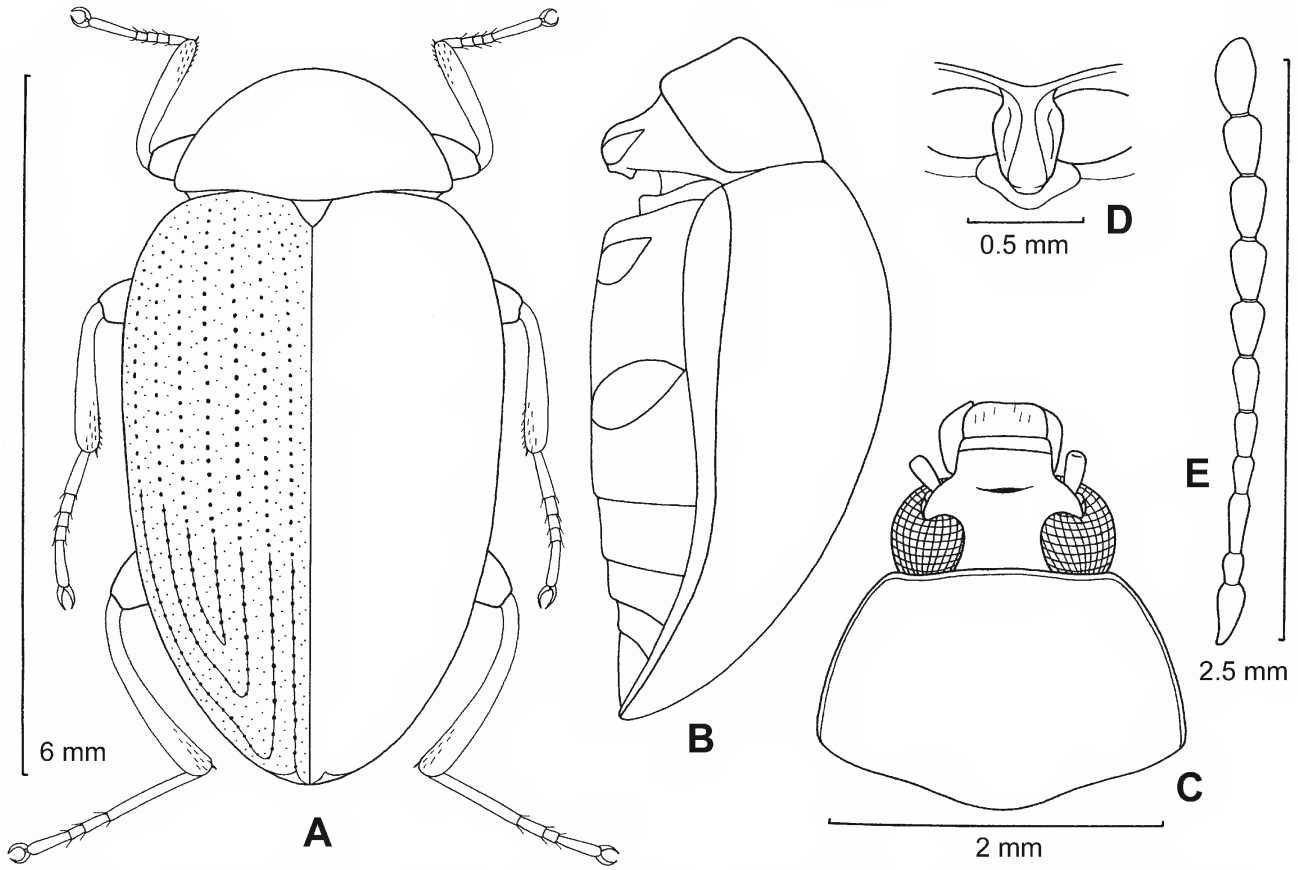

Fig. 2. *Amarygmus subopacus* n. sp. – **A** Habitus. **B** Body, lateral view. **C** Head and pronotum. **D** Prosternal apophysis. **E** Antenna.

punctate. Median line incised and depressed on its whole length.

Sternites: Anterior margin between metacoxae ogival, bordered. Sternites strongly microreticulated, nearly impunctate.

Antennae: Reaching to anterior third of elytra. Length/width ratio of antennomeres 1–11 equals to 11:5 / 6½:4½ / 10½:4½ / 8:4½ / 8:5 / 10:6 / 12:7 / 12½:7½ / 12:7½ / 12:7½ / 17:8.

Legs: Short. Femora thickened towards the second third. Pro- and mesotibiae on outer side slightly bent in basal third, straight in apical two-thirds, straight on more than two-thirds on inner side. Metatibia moderately bent over the whole length. Lengths of protarsomeres 1–5 as 6:6:4:3:17; lengths of mesotarsomeres 1–5 as 15:9:5:4:19; lengths of metatarsomeres 1–4 as 36:10:6:17.

Amarygmus hesperus **n. sp.**
(Fig. 3A–H)

Holotype (♂): Mt. Balocaue, Leyte Island, Philippines, VI.2006, D. Mohagan leg. (CA).

Paratypes: Philippines, Leyte, Mt. Balocaue, VI.2006 (no collector mentioned) (1 ♀ CA, 1 ♀ ZSM).

Etymology

Hesperus, from Έσπερος (Greek) = evening star.

Diagnosis

Relatively large, elongate oval. Pronotum and elytra relatively flat; elytra with rows of large punctures which are slightly impressed; elytral intervals slightly convex on disc; frons narrow; antennae long; legs relatively long and thin, protarsomeres 1–3 slightly enlarged in males. Elytra reddish violet, somewhat lustrous, pronotum in two specimens golden, in one reddish violet. Head and legs black.

Amarygmus hesperus n. sp. belongs to a group of species with a similar shape, low convexity of the upperside, elytral rows of punctures, narrow frons, long antennae, and pro- and mesotarsomeres 1–3 slightly enlarged in males: *Amarygmus planipennis* (Kulzer, 1951), *A. spectabilis* (Gebien, 1921) and *A. jaegeri* Bremer, 2009.

Amarygmus planipennis and *A. spectabilis* are somewhat larger (body length of *A. planipennis* 11.4–14.1 mm, of *A. spectabilis* 11.9–12.1 mm); *A. jaegeri* has about the

same length as *A. hesperus*. *A. spectabilis* and *A. jaegeri* present the same colour on pronotum and elytra, while *A. planipennis* and *A. hesperus* show a different colouration of pronotum and elytra: the colour of the upperside of *A. jaegeri* is uniformly coppery, that of *A. spectabilis* is brown and lustrous; *A. planipennis* has a greenish-purple or blue pronotum and greenish ground colour on the elytra (*A. hesperus* a golden or reddish-violet pronotum and reddish brown elytra). *A. planipennis* and *A. spectabilis* have the punctures in the elytral rows smaller and more closely set than in *A. hesperus*. *A. jaegeri* has relatively large punctures in the elytral rows (as in *A. hesperus*), but its punctures are more elongate and mostly connected by lines on the disc.

Description

Measurements: Body length: 10.4–11.5 mm. Body width: 5.81–6.37 mm. – Ratios: Pronotum: width/length 1.79–1.89; width hind corners/width front corners 1.77–1.81. Elytra: length/width 1.47–1.49; length elytra/length pronotum 3.85–4.10; maximum width elytra/maximum width pronotum 1.44–1.46.

Colouration: Elytra reddish brown, somewhat lustrous, with green iridescence, pronotum in two specimens golden, in one reddish violet, with iridescence in different colours. Legs black. Ground colour of antennae black (but at lower magnification with a brownish tinge because of the short brown hairs). Underside black.

Head: Frons narrow in both sexes, about as wide as the diameter of two ocelli of the eye, with small, indistinct punctures. Eyes large, occupying a large part of the head and circumventing the genae from two sides. Genae narrow and short, directed obliquely to the front, only slightly raised, anteriorly terminating behind the level of the middle part of the fronto-clypeal suture. Fronto-clypeal suture slightly impressed in the middle, not incised. Clypeus protruded forwards, slightly convex longitudinally, punctures more distinct and more closely set than on frons. Mentum with bent sides and a rounded transition between sides and base; lateral margins flat, slightly lustrous; space in

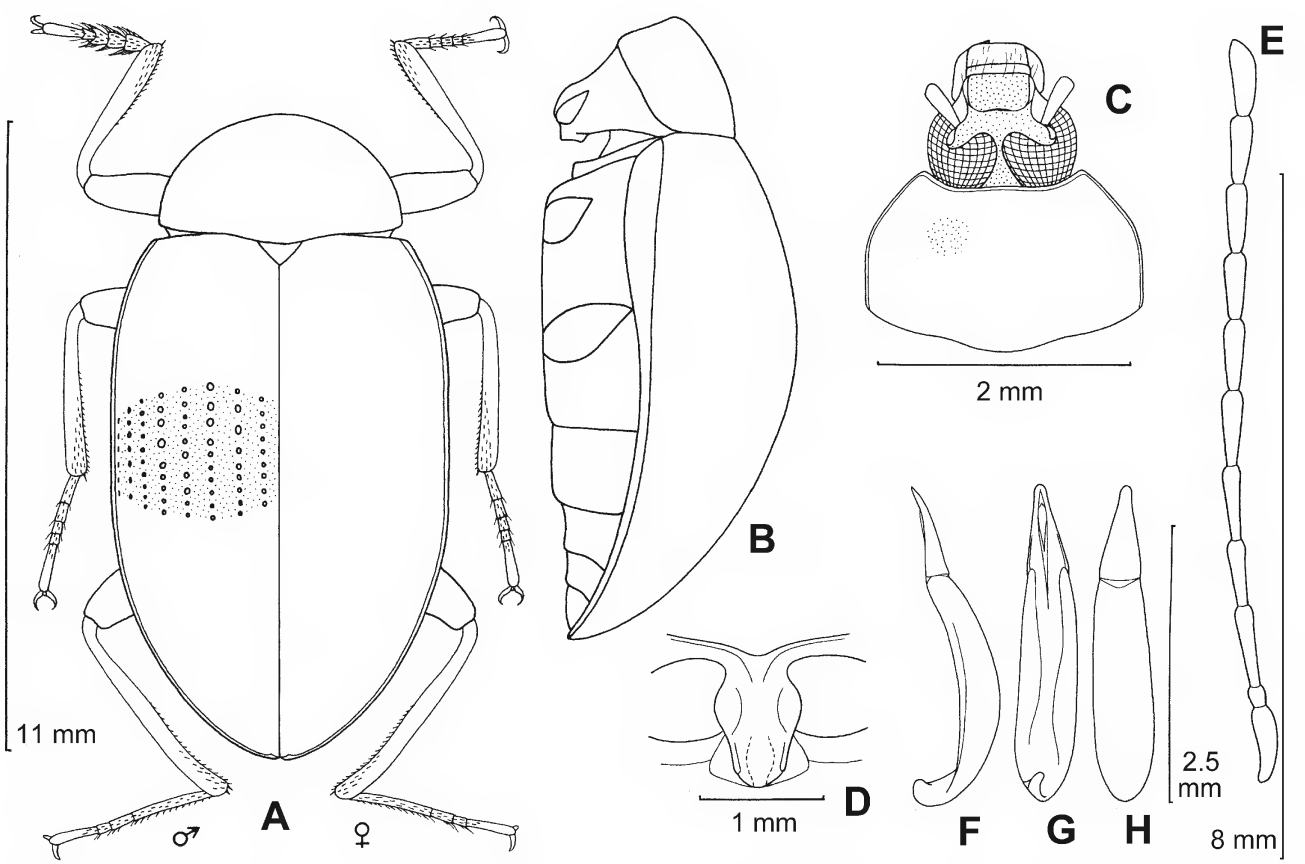

Fig. 3. *Amarygmus hesperus* n. sp. – **A** Habitus; legs on left side ♂, right side ♀. **B** Body, lateral view. **C** Head and pronotum. **D** Prosternal apophysis. **E** Antenna. **F** Aedeagus, lateral view. **G** Aedeagus, ventral view. **H** Aedeagus, dorsal view.

between opaque, slightly convex transversely. Mandibles with a longitudinal sulcus on outer surface, apically bifid.

Pronotum: Relatively narrow and short when compared with elytra. Moderately convex transversely and longitudinally. Widest at base, anteriorly narrowing and bent. Front corners in dorsal view somewhat projecting forwards, rectangular; hind corners obtuse. Anterior margin excavated. Lateral and anterior margins continuously bordered. Lateral borders in dorsal view well visible on their whole length. Front corners in lateral view rectangular; hind corners angular and obtuse. Surface with tiny, inconspicuous punctures.

Scutellum: Triangular, with a few tiny punctures.

Elytra: Relatively long, oval. Maximum width and height somewhat anterior to the middle. Shoulders obtuse and scarcely prominent. Apices of elytra mutually rounded. Lateral edges in dorsal view visible on their whole length. Rows of large punctures somewhat impressed on disc, but not linked by lines; apically and laterally they are clearly impressed, appearing to be striae; rows 4 and 5 terminating free posteriorly; distance between punctures on disc in row 4 about half the diameter of a puncture; about 40 punctures in row 4. Intervals on disc slightly convex, laterally and apically distinctly convex; with tiny, inconspicuous punctures.

Prosternum: Anterior margin bent upwards, with a triangular process towards apophysis in the middle. Apophysis relatively narrow, somewhat widened along procoxae and the margins slightly raised; median groove in between shallow; posterior to procoxae the apophysis is horizontally prolonged and its lateral margins are somewhat narrowing, apically rounded.

Mesosternum: Hind part of apophysis with a rough surface, its anterior margin excavated in the middle.

Metasternum: Anterior margin between mesocoxae rounded, bordered. Disc with minute, distinct punctures. Median line impressed in its posterior fourth.

Sternites: Anterior margin between metacoxae ogival, bordered. Sternites 1 and 2 with minute, relatively closely set punctures. Punctures on sternites 3–5 tiny. Male sternite 5 slightly depressed apically.

Antennae: Long, reaching to the middle of elytra. Length/width ratio of antennomeres 1–11 equals to 20:6 / 7:5½ / 21:6 / 18:6 / 19:6 / 20:6½ / 19:6½ / 20:6½ / 18:6½ / 18:6½ / 21:7.

Legs: Of medium length, relatively narrow. Femora only slightly thickened towards the second third; meso- and metafemora posteriorly with long, mostly recumbent hairs in males. Pro- and mesotibiae straight, metatibia straight in the basal half, slightly incurved in the apical half. Lengths of protarsomeres 1–5 (female) as 7:6:5:5:21; lengths of mesotarsomeres 1–5 as 12:8:7:6:23; lengths of metatarsomeres 1–4 as 32;8:7:23.

Aedeagus: See Fig. 3F–H.

Amarygmus illex **n. sp.**
(Fig. 4A–I)

Holotype (♂): Philippines, Leyte, Mt. Balocaue, VI.2006 (CA) (left foreleg missing).

Etymology

Illex (Lat.) = seductive.

Diagnosis

Of medium size; oval, markedly convex; elytra with incised striae and somewhat convex intervals; frons relatively narrow; antennae of medium length; protarsomeres 1–3 distinctly widened in males. Ground colour of upperside green, but partially with violet iridescence on intervals longitudinally; pronotum with colourful iridescence.

Body shape and male tarsomeres and sternite 5 of *Amarygmus illex* resemble *A. platolenoides* Bremer, 2009, which also occurs on Leyte, but it differs by its larger size (body length of *A. platolenoides* 4.9–5.4 mm) and the shape of the aedeagus (see Bremer 2009a: fig. 22G–H).

Description

Measurements: Body length: 8.68 mm. Body width: 5.57 mm. – Ratios: Pronotum: width/length 1.94; width hind corners/width front corners 1.94. Elytra: length/width 1.27; length elytra/length pronotum 3.42; maximum width elytra/maximum width pronotum 1.39.

Colouration: Upperside see Diagnosis. Legs and antennae black. Underside black, somewhat lustrous.

Head: Frons relatively narrow, narrower than length of antennomere 4 (like 7 : 9), with some tiny punctures. Genae clearly raised, anteriorly terminating somewhat in front of the level of the fronto-clypeal suture. Fronto-clypeal suture transversely narrowly incised, the incision scarcely wider than frons. Clypeus protruded forwards, slightly higher situated than frons, convex longitudinally; with tiny, widely separated punctures. Mentum widened anteriorly, with bent sides and a rounded transition between sides and base; lateral margins flat, space in between opaque, slightly convex transversely. Mandibles with a longitudinal sulcus on outer surface, apically bifid.

Pronotum: Convex transversely and longitudinally; widest at base, anteriorly narrowing and bent. Front corners in dorsal view nearly rectangular; hind corners angular, with an angle of about 100°. Anterior margin distinctly excavated. Lateral and anterior margins continuously bordered. Lateral borders in dorsal view narrowly visible on their whole length. Front corners in lateral view angular, with an angle of about 105°; hind corners angular and more obtuse. Surface with distinct, small, relatively closely set punctures.

Scutellum: Triangular, impunctate.

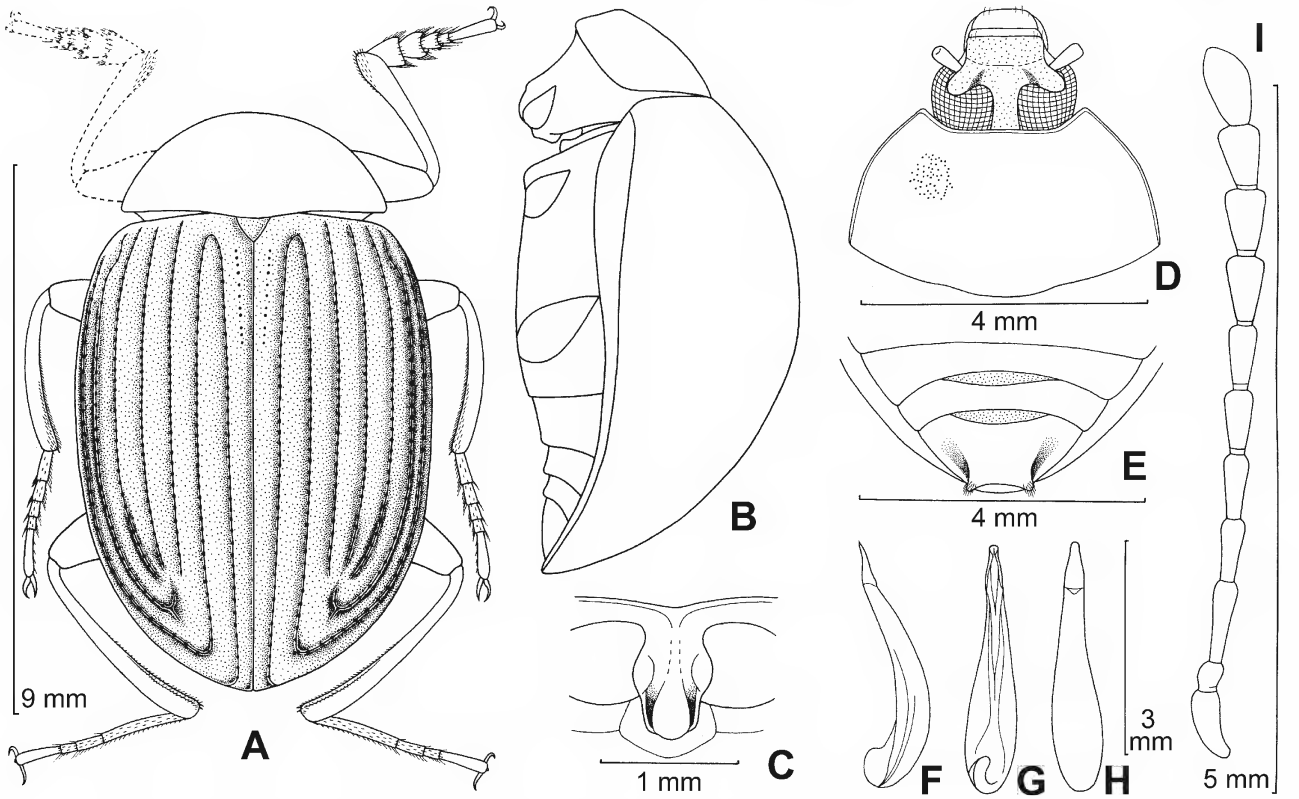

Fig. 4. *Amarygmus illex* n. sp. – **A** Habitus. **B** Body, lateral view. **C** Prosternal apophysis. **D** Head and pronotum. **E** Sternites 3–5. **F** Aedeagus, lateral view. **G** Aedeagus, ventral view. **H** Aedeagus, dorsal view. **I** Antenna.

Elytra: Widely oval, markedly convex transversely and longitudinally. Maximum width and height shortly anterior to the middle. Shoulders rounded and obtuse. Apices of elytra mutually rounded. Lateral edges in dorsal view narrowly visible. Surface with deeply incised striae; with small, slightly elongate punctures; striae 4 and 5 terminating freely, not connected to each other; distance between strial punctures on disc in row 4 approximately the diameter of a puncture; about 34 punctures in row 4. Intervals convex, with tiny, inconspicuous punctures.

Prosternum: Anterior margin narrowly bent upwards, with a short process towards apophysis in the middle. Apophysis widened along procoxae, with raised lateral margins, space in between with a relatively deep median groove; posterior to procoxae the apophysis is horizontally protruding, with subparallel sides, apically widely pointed.

Mesosternum: Surface of hind part smooth, its anterior margin excavated in the middle.

Metasternum: Anterior margin between mesocoxae rounded, bordered. Except some irregular punctures anteriorly the disc is covered with tiny, widely separated punctures. Median line slightly incised on its whole length.

Sternites: Anterior margin between metacoxae ogival, narrowly bordered. Sternites 1 and 2 anteriorly with superficial ridges, posteriorly with minute punctures. Sternites 3 and 4 with tiny punctures. Sternite 5 apically excavated and somewhat raised in the middle (Fig. 4E).

Antennae: Reaching to anterior third of elytra. Length/width ratio of antennomeres 1–11 equals to 9:4½ / 5:4 / 12:4 / 9:4½ / 10:4½ / 11:5½ / 11:5½ / 10½:6 / 10:6 / 10:6 / 15:6½.

Legs: Short. Femora thickened towards the second third. Protibia straight on outer side, somewhat broadened in apical third on inner side; mesotibia moderately bent, on inner side with oblique bristle-like hairs of medium length; metatibia nearly straight in basal half, somewhat incurved in apical half. Protarsomeres 1–3 very wide, of decreasing width (Fig. 4A). Lengths of protarsomeres 1–5 as 12:9:6:4:20; lengths of mesotarsomeres 1–5 as 20:7:6:4½:20; lengths of metatarsomeres 1–4 as 29:11:9:20.

Aedeagus: See Fig. 4F–H.

Amarygmus pyritidis **n. sp.**
(Fig. 5A–E)

Holotype (♀): Philippines, 1600 m, Mindanao, 30 km west of Maramag, 28.–30.XII.1990, Bolm leg. (NHMB).

Etymology

Pyritis (genitive pyritidis) = name of a black precious stone in the "Naturalis historia" of PLINIUS senior. It is unknown which precious stone was meant.

Diagnosis

Small, oval, upperside black, lustrous. Elytra with rows of distinct, medium-sized punctures and flat, well punctured intervals; frons relatively wide; antennae of medium length; protibiae slightly bent, mesotibiae moderately bent, metatibiae straight in basal half, somewhat incurved in apical half.

Amarygmus pyritidis n. sp. keys out at couplet 45 of BREMER's (2009a) key (= *A. schultzei* Bremer, 2009, found on Luzon). *A. schultzei* is slightly larger (body length 5.3–6.1 mm), it is characterized by a charcoal-grey upperside markedly contrasting to the yellowish brown legs (the dark brown legs of *A. pyritidis* do not distinctly contrast to the black upperside); the punctures of the elytral rows of *A. schultzei* are distinctly smaller than those of *A. pyritidis*, and the prosternal apophysis of *A. schultzei* has a sharply pointed apex (apically rounded in *A. pyritidis*).

Description

Measurements: Body length: 4.94 mm. Body width: 3.27 mm. – Ratios: Pronotum: width/length 2.04; width hind corners/width front corners 1.68. Elytra: length/width 1.29; length elytra/length pronotum 3.86; maximum width elytra/maximum width pronotum 1.47.

Colouration: Upperside black, lustrous. Underside, femora and tibiae dark brown, tarsomeres brown.

Head: Frons wide, wider than length of combined antennomeres 3 + 4 (like 25 : 22), with tiny, widely separated punctures. Genae barely raised, anteriorly terminating in front of the level of the middle part of the fronto-clypeal suture. Fronto-clypeal suture slightly incised in the middle. Clypeus moderately protruded forwards, nearly flat, punctation as on frons. Mentum widened anteriorly, with bent sides and rounded transition between sides and base, convex transversely. Mandibles with a longitudinal sulcus on outer surface, apically bifid.

Pronotum: Relatively wide, moderately convex transversely, slightly convex longitudinally. Widest at base, anteriorly narrowing and bent. Front corners in dorsal view rounded; hind corners strongly obtuse. Anterior margin

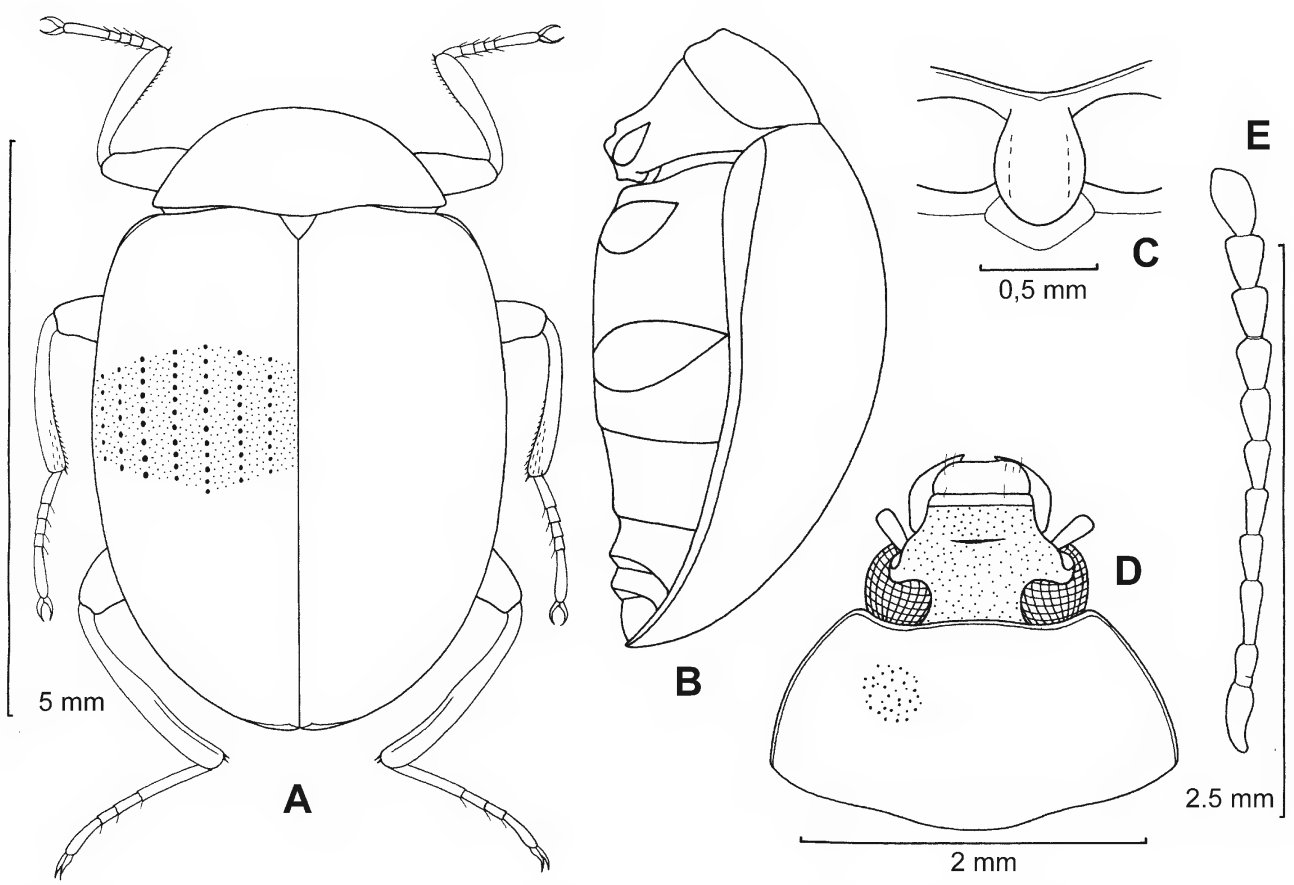

Fig. 5. *Amarygmus pyritidis* n. sp. – **A** Habitus, female. **B** Body, lateral view. **C** Prosternal apophysis. **D** Head and pronotum. **E** Antenna.

distinctly excavated. Lateral and anterior margins bordered. Lateral borders in dorsal view barely visible in the anterior fourth. Front corners in lateral view obtuse and rounded; hind corners more angular. Surface with minute, relatively closely set punctures.

Scutellum: Triangular, with a few tiny punctures.

Elytra: Oval, convex transversely and longitudinally. Maximum width and height slightly anterior to the middle. Shoulders rounded and somewhat prominent. Apices of elytra mutually rounded. Lateral edges in dorsal view visible only on shoulders and on apex. Surface with rows of medium-sized punctures, their distance on disc in row 4 about 1–1½ diameters of a puncture; about 38 punctures in row 4. Intervals flat, with minute, distinct, relatively closely set punctures.

Prosternum: Anterior margin continuously and narrowly bent upwards. Apophysis wide, flat, lateral margins along procoxae slightly raised; lateral margins and apex rounded.

Mesosternum: Hind part somewhat raised, its lateral margins rough and with minute tubercles, its centre smooth; anterior margin excavated in the middle.

Metasternum: Anterior margin between mesocoxae rounded, bordered. Anterior apophysis smooth anteriorly, separated from disc by large punctures posteriorly. Disc with tiny, distinct, widely separated punctures. Median line neither incised nor impressed.

Sternites: Anterior margin between metacoxae ogival, indistinctly bordered. Anterior part of sternites 1 and 2 with some small punctures, posterior part and sternites 3–5 nearly impunctate.

Antennae: Reaching to anterior third of elytra. Length/width ratio of antennomeres 1–11 equals to 12:7 / 6:5 / 13:4 / 9:4 / 9:4 / 9:5 / 10½:6½ / 11:7 / 11:7½ / 10½:7½ / 15:8.

Legs: Short. Femora thickened towards the second third. Tibiae somewhat tender; protibia slightly bent; mesotibia more bent than protibia; metatibia moderately bent, on inner side with a small swelling in the middle (Fig. 5A). Lengths of protarsomeres 1–5 as 6:5:5:4½:17; lengths of mesotarsomeres 1–5 as 16:9:5½:5:18; lengths of metatarsomeres 1–4 as 25:11:7:19.

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Ardoiniellus montanus n. gen., n. sp. and nine new species of *Enicmosoma* Gebien from South Africa and Zimbabwe (Coleoptera: Tenebrionidae: Lupropini)[1]

Wolfgang Schawaller

Abstract

Ardoiniellus **n. gen.** (Tenebrionidae: Lagriinae: Lupropini), monotypical with the wingless species *A. montanus* **n. sp.** from the Swartberge Mountains in South Africa, and nine new species of the related genus *Enicmosoma* Gebien, 1922 from South Africa and Zimbabwe are described (*E. amatolensis* **n. sp.**, *E. capensis* **n. sp.**, *E. danieli* **n. sp.**, *E. hararensis* **n. sp.**, *E. peteri* **n. sp.**, *E. proteacola* **n. sp.**, *E. ruthae* **n. sp.**, *E. sebastiani* **n. sp.**, and *E. swartbergensis* **n. sp.**). *Enicmonota* Ardoin, 1958 and *Parenicmosoma* Ardoin, 1958 are considered as junior synonyms of *Enicmosoma* Gebien, 1922. All species are illustrated, a distribution map is provided, a key to the species of *Enicmosoma* in southern Africa and a complete species list of the genus *Enicmosoma* are given.

Keywords: Coleoptera, Tenebrionidae, Lupropini, *Ardoiniellus*, *Enicmosoma*, new genus, new species, South Africa, Zimbabwe.

Zusammenfassung

Ardoiniellus **n. gen.** (Tenebrionidae: Lagriinae: Lupropini), monotypisch mit der flügellosen Art *A. montanus* **n. sp.** von den Swartbergen in Südafrika, und neun neue Arten der verwandten Gattung *Enicmosoma* Gebien, 1922 aus Südafrika und Zimbabwe werden beschrieben (*E. amatolensis* **n. sp.**, *E. capensis* **n. sp.**, *E. danieli* **n. sp.**, *E. hararensis* **n. sp.**, *E. peteri* **n. sp.**, *E. proteacola* **n. sp.**, *E. ruthae* **n. sp.**, *E. sebastiani* **n. sp.**, und *E. swartbergensis* **n. sp.**). *Enicmonota* Ardoin, 1958 und *Parenicmosoma* Ardoin, 1958 werden als jüngere Synonyme von *Enicmosoma* Gebien, 1922 betrachtet. Alle Arten werden abgebildet und in einer Verbreitungskarte aufgeführt. Ein Bestimmungsschlüssel für die *Enicmosoma*-Arten des südlichen Afrikas wurde erstellt und eine vollständige Artenliste der Gattung *Enicmosoma* wird angefügt.

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1 Introduction

The genus *Enicmosoma* (type species *E. punctum* Gebien, 1922) was established by Gebien (1922), based on three species from the Seychelles and Mauritius. The genus is placed in the the tribe Lupropini Ardoin, 1958 of the subfamily Lagriinae Latreille, 1825. The ovipositor is of the primitive type present in most Lagriinae, with the fourth coxite lobes long and digitiform, bearing short terminal gonostyles. Subsequently, several species of *Enicmosoma* were described from Madagascar and Réunion (Ardoin 1958), one from Central Africa (Ardoin 1957), and one from South Africa (Ardoin 1964). Ferrer (2005) added a species from Angola. The late Dr. Sebastian Endrödy-Younga collected several diverse specimens from different localities in South Africa, deposited in the Museum Pretoria, which I found only recently, during my last visit. This South African material of *Enicmosoma* was unknown to me when redescribing *Terametus* Motschulsky, 1869 and discussing distributional patterns within this group

[1] Contributions to Tenebrionidae, no. 107. – For no. 106 see: Deutsche Entomologische Zeitschrift 60 (2013).

(SCHAWALLER 2007a). A further species was recently found in Zimbabwe, deposited in NHMB. All these newly collected specimens from South Africa and Zimbabwe turned out to be new species, which are described in the present contribution. A key to the *Enicmosoma* species in southern Africa and a list of all known species is given below. ARDOIN (1958) excluded the species *minutum* Brancsik, 1893 (Madagascar) and *natalis* Motschulsky, 1873 (Natal) from *Enicmosoma* with good arguments and placed both in *Heterophylus* Kluge, 1833. For the collecting localities of the treated species see map Fig. 1. The biological data are based on the information of the labels.

Enicmosoma is morphologically close to *Terametus* Motschulsky, 1869 from the Table Mountain on the Cape Peninsula. These two genera share the following external characters: eyes round and prominent with few but large ommatidia, terminal antennomeres distally without any distinct fields of sensilla, all tarsal segments and claws short, tibiae without external keels and without distinct spurs, punctation on elytra irregular without rows or striae, general shape of the aedeagus with long basale and triangular apicale. The main differences between these two genera are in the structure of the lateral pronotal margins (smooth in *Terametus*, crenulate in *Enicmosoma*), and particularly in the segmentation of the antennae (11-segmented with loose 3-segmented club in *Terametus*, 10-segmented with compact 2-segmented club, or only with a single broad terminal antennomere in *Enicmosoma*). In *Terametus* the antennomere 3 is not elongate, in *Enicmosoma* the antennomere 3 is either not elongate or distinctly longer than antennomere 2.

Some specimens were found hiding in the Ditsong National Museum of Natural History in Pretoria among the numerous specimens of *Enicmosoma* from South Africa, which are similar to *Enicmosoma* but represent a different genus new to science, monotypical so far. These are described here as *Ardoiniellus montanus* n. gen., n. sp. This flightless taxon might be a further endemic in the mountains of the Cape area (see SCHAWALLER 2011). It shares with *Terametus* the 11-segmented antennae with loose 3-segmented club, but differs mainly by longer and flat body, by visible scutellum and by reduced hind wings. Further genera of the tribe Lupropini in South Africa and Madagascar were treated by SCHAWALLER (2005, 2007b, 2011).

Acronyms of depositories

NHMB Naturhistorisches Museum, Basel, Switzerland
SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany
TMSA Ditsong National Museum of Natural History, Pretoria, South Africa

Acknowledgements

For the trustful loan of specimens from the collections under their care, for the permission to keep some duplicates in SMNS, and for outstanding hospitality during my visits I thank RUTH MÜLLER (Pretoria), as well as Dr. MICHEL BRANCUCCI † and Dr. EVA SPRECHER (both Basel). South African authorities provided collecting permits for joint fieldwork of SMNS and TMSA. The photographs were taken by my colleague JOHANNES REIBNITZ (Stuttgart) with a Leica DFC320 digital camera on a Leica MZ16 APO microscope and subsequently processed by him with Auto-Montage (Syncroscopy) software. Last but not least I thank both referees, Dr. ROLAND GRIMM (Neuenbürg) and Dr. OTTÓ MERKL (Budapest), for improvements.

2 Taxonomy

2.1 *Ardoiniellus*

2.1.1 *Ardoiniellus* **n. gen.**

Etymology: Named in honour of JEAN PAUL ARDOIN (1918–1978), pharmacist in Arcachon (France), specialist of *Enicmosoma* and other tenebrionids from Africa and Madagascar.

Type species: *Ardoiniellus montanus* n. sp. by monotypy and present designation. The name is used in masculine gender.

Diagnosis: *Ardoiniellus* n. gen. possesses all characters of the tribe Lupropini and is placed near *Enicmosoma* Gebien, 1922 and *Terametus* Motschulsky, 1869 (redescription and figures see SCHAWALLER 2007a). All species of these genera share small body size of 1.8–3.0 mm. Whereas in *Enicmosoma* species the antenna is 10-segmented with compact 2-segmented club or with broad terminal antennomere, in *Terametus* and *Ardoiniellus* n. gen. the antenna is 11-segmented with loose 3-segmented club. *Ardoiniellus* n. gen. can be separated from *Terametus* by flat pronotum widest before middle (highly convex and widest at base in *Terametus*), longer and flat elytra widest behind middle (round, highly convex and widest in middle in *Terametus*), visible scutellum (scutellum covered by pronotum in *Terametus*), and missing hind wings (present in *Terametus*).

2.1.2 *Ardoiniellus montanus* **n. sp.**
(Figs. 2, 14)

Holotype (♂): South Africa, S Cape, Swartberg Pass, 1770 m, 1.VIII.1979, leg. W. BREYTENBACH, TMSA.

Paratypes: Same data as holotype, 1 ex. TMSA, 2 ex. SMNS. – South Africa, S Cape, Helderfontein, 1150 m, 8.III.1979, leg. S. ENDRÖDY-YOUNGA, 1 ex. TMSA. – South Africa, S Cape, Swartberge, E Blesberg, 2000 m, 5.XI.1978, leg. S. ENDRÖDY-YOUNGA, 1 ex. TMSA. – South Africa, S Cape, W Mt. Grootberg, 1450 m, 1.XI.1978, leg. S. ENDRÖDY-YOUNGA, 3 ex. TMSA, 2 ex. SMNS.

Etymology: Refers to the high altitude of the type locality in the Swartberge Mountains.

Description: Body length 1.8–2.5 mm. Dorsal and ventral surfaces and all appendages brown without colour pattern and without metallic shine; dorsal and ventral

surfaces punctured, punctures with microsetae, surface between punctures shining (Fig. 2). Head with punctation slightly coarser and denser than pronotum; genae somewhat swollen but not dilated, with transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae, consisting of about 20 ommatidia; maxillary palps with large securiform terminal palpomere; antennae with 11 antennomeres, shape of the antennomeres as in Fig. 2, antennomere 3 not elongate and as long as antennomere 2, terminal 3 antennomeres forming a loose club, all antennomeres with similar acute setae but without denser concentration of other sensilla. Pronotum widest before middle, anterior and posterior margins unbordered, lateral margins bordered and slightly undulate, anterior corners marked but not acute, posterior corners rectangular; surface convex with irregular punctation, punctures somewhat smaller than on head but of same size as on elytra, but punctation somewhat denser than on elytra, propleura with punctation coarser but sparser than on pronotum, prosternal process short and bent down, metasternal punctures larger laterally than medially. Scutellum visible, not covered by the pronotum. Hind wings completely missing. Elytra widest behind middle, lateral margins visible in dorsal view along anterior half of elytra, surface with irregular punctation not arranged in rows or striae, epipleura with punctation similarly large and dense as on elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered, membranes between ventrites 3/4 and 4/5 distinctly exposed. Legs without particular modifications, tibiae somewhat clavate, without external keels, tibial spurs absent, all tarsomeres short but broad in both sexes. Aedeagus (Fig. 14) with long basale and short spade-like apicale with rounded tip. Ovipositor with coxite lobe 4 long and digitiform, gonostyles short and attached apically, coxites combined shorter than paraproct. Without distinct external sexual dimorphism.

Biological data: Sifted from fynbos litter, or found in pitfall traps baited with fermented banana.

2.2 *Enicmosoma*

2.2.1 Subgenera

Ardoin (1958) established the subgenera *Enicmosoma* s. str., *Enicmonota* and *Parenicmosoma*, which were later elevated to generic rank (Ardoin 1964). However, this subgeneric classification was based on quite "weak" characters (i. e. shape of antennomeres, shape and colour of body). These characters cannot be the base for phylogenetical argumentation and therefore *Enicmonota* Ardoin, 1958 and *Parenicmosoma* Ardoin, 1958 are considered herein as junior synonyms of *Enicmosoma* Gebien, 1922.

2.2.2 The species of *Enicmosoma* in southern Africa

Enicmosoma amatolensis **n. sp.**
(Figs. 3, 15)

Holotype (♂): South Africa, Eastern Cape, Amatole Isidenge Forest Station, 18.XI.1987, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 2 ex. SMNS. – South Africa, Eastern Cape, Amatole Mts., Hogsback, II.1967, leg. L. Schulze, 2 ex. TMSA. – South Africa, Eastern Cape, Barkly East, II.1967, leg. L. Schulze, 1 ex. TMSA. – South Africa, Eastern Cape (labelled as Transkei), Dwesa Forest Reserve, 17.XII.1979, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Richards Bay, 5.XI.1992, leg. W. Wittmer, 1 ex. NHMB.

Etymology: Named after the Amatole Isidenge Forest Station, where the holotype was collected.

Description: Body length 2.5–2.8 mm. Dorsal and ventral surfaces and all appendages brown without metallic shine; dorsal and ventral surfaces punctured, punctures with longer adpressed, pale setae, surface between punctures shining (Fig. 3). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, with weak transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 3, antennomere 3 distinctly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest shortly before middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners rounded, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation smaller and sparser than on pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 15) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by smaller body size (less than 3.0 mm in the average), unicoloured light brown surface, antennomere 3 distinctly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with rounded, slightly crenulate lateral margins and rounded anterior corners, shining surface of elytra between punctures, longer elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 15). For separation from the other species from southern Africa see the key below.

Biological data: Collected from fungous trunk of *Quercus*, beaten in forest, or netted from grass and inflorescences of *Arum* flowers.

Enicmosoma capensis n. sp.
(Figs. 4, 16)

Holotype (♂): South Africa, Western Cape, Keurboomstrand, 15.XII.1976, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 2 ex. TMSA, 2 ex. SMNS. – South Africa, Eastern Cape, Heuningskloof, 6.XII.1995, leg. C. L. Bellamy, 1 ex. TMSA.

Etymology: Named after the Cape of Good Hope, in whose vicinity the type series was collected.

Description: Body length 2.3–2.8 mm. Dorsal and ventral surfaces and all appendages brown without metallic shine; dorsal and ventral surfaces punctured, punctures with small adpressed, pale setae, surface between punctures shining (Fig. 4). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, with weak transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 4, antennomere 3 feebly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest shortly before middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners slightly marked but not prominent or acute, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation smaller and sparser than on pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 16) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by smaller body size (less than 3.0 mm in the average), unicoloured brown surface, antennomere 3 only feebly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with nearly parallel, distinctly crenulate lateral margins and slightly marked anterior corners, shining surface of elytra between punctures, shorter elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 16). For separation from the other species from southern Africa see the key below.

Biological data: Collected from white flowering shrubs, or beaten from vegetation.

Enicmosoma danieli n. sp.
(Figs. 5, 17)

Holotype (♂): South Africa, Eastern Cape (labelled as Transkei), Port St. Johns, Silaka, 29.XI. & 2.XII.1987, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 1 ex. TMSA. – South Africa, Mpumalanga, Mariepskop NR, Blyde River, 800–1000 m, 23.–26.XI.2008, leg. W. Schawaller, 2 ex. SMNS. – South Africa, Limpopo, Lekgalameetse NR, 800–1000 m, 27.XI.–1.XII.2008, leg. W. Schawaller, 2 ex. SMNS. – South Africa, Limpopo, Lekgalameetse NR, 850 m, 26.XI.–28.XI.2008, leg. R. Müller, 4 ex. TMSA.

Etymology: Named in honour of Daniel Bartsch (Stuttgart), specialist of Sesiidae (Lepidoptera), for various support during our joint fieldwork in 2008, when parts of the type series were collected.

Description: Body length 3.0–3.5 mm. Dorsal and ventral surfaces and all appendages dark brown without metallic shine, in some specimens elytra with 2 indistinct darker longitudinal bands; dorsal and ventral surfaces punctured, punctures with small adpressed, pale setae, surface between punctures shining (Fig. 5). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, without distinct transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 5, antennomere 3 distinctly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners rounded, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation and setation similar to that of pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 17) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by larger body size (more than 3.0 mm in the average), dark brown surface with darker colour pattern on elytra, by antennomere 3 distinctly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with rounded, dis-

tinctly crenulate lateral margins and rounded anterior corners, shining surface of elytra between punctures, shorter elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 17). For separation from the other species from southern Africa see the key below.

Biological data: Collected at UV-light, or by light trap.

Enicmosoma freyi Ardoin, 1964
(Figs. 13, 18)

Examined type material: South Africa, NE Mpumalanga (labelled as Transvaal), Sabie (misspelled as Sabri in the description), I.1952, leg. G. Frey, ♀ holotype NHMB.

New material: South Africa, Gauteng (labelled as Transvaal), Kempton Park, I.1951, leg. A. R. Capener, 12 ex. TMSA, 5 ex. SMNS.

Redescription: Body length 3.0–3.5 mm. Dorsal and ventral surfaces and all appendages light brown without metallic shine; dorsal and ventral surfaces punctured, punctures with longer adpressed, pale setae, surface between punctures shining (Fig. 13). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, without distinct transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 13, antennomere 3 distinctly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest slightly before middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners rounded, posterior corners rectangular; surface feebly convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation and setation similar to that of pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins visible only shortly before apex, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 18) with long basale and elongate triangular apicale with rounded tip.

Remarks: To be recognized by larger body size (more than 3.0 mm in the average), unicoloured pale brown surface, antennomere 3 distinctly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with nearly parallel, distinctly crenulate lateral margins and rounded anterior corners, shining surface of elytra between punctures, longer elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 18). For separation from the other species from southern Africa see the key below.

Enicmosoma hararensis **n. sp.**
(Figs. 6, 19)

Holotype (♂): Zimbabwe, Harare, Mazoe Botanical Reserve, 1300 m, 10.II.1987, leg. W. Wittmer, NHMB.

Paratypes: Same data as holotype, 7 ex. NHMB, 3 ex. SMNS, 2 ex. TSMA.

Etymology: Named after Harare, the capital of Zimbabwe, where the type series was collected.

Description: Body length 2.5–3.0 mm. Dorsal and ventral surfaces and all appendages brown without colour pattern and without metallic shine; dorsal and ventral surfaces punctured, punctures with small adpressed, pale setae, surface between punctures shining (Fig. 6). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, with distinct transverse impression between genae; anterior margin of clypeus straigth and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 6, antennomere 3 distinctly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners slightly marked but not prominent or acute, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation and setation similar to that of pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 19) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by smaller body size (less than 3.0 mm in the average), unicoloured brown surface, antennomere 3 distinctly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with nearly parallel, distinctly crenulate lateral margins and slightly marked anterior corners, shining surface of elytra between punctures, longer elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 19). For separation from the other species from southern Africa see the key below.

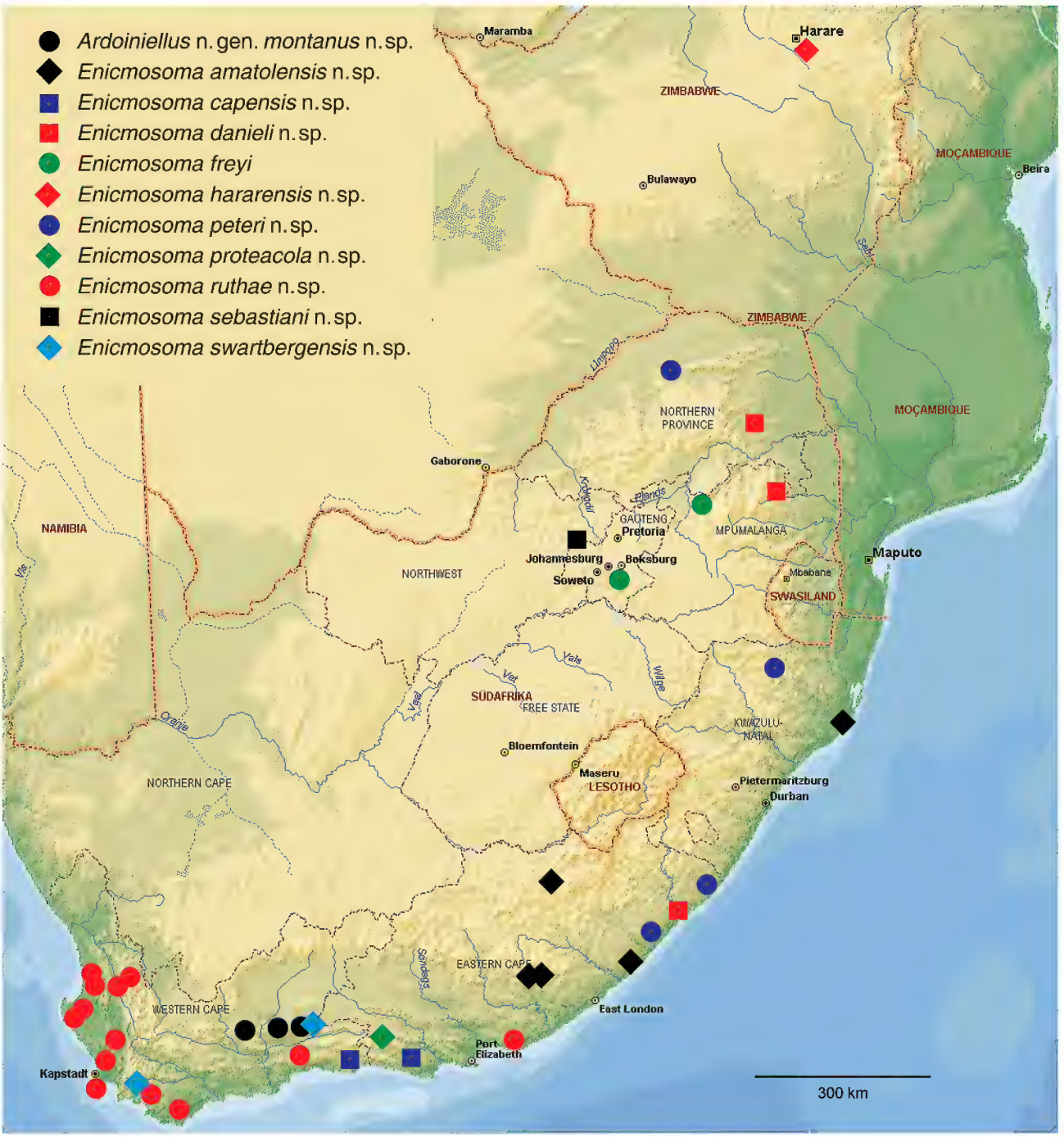


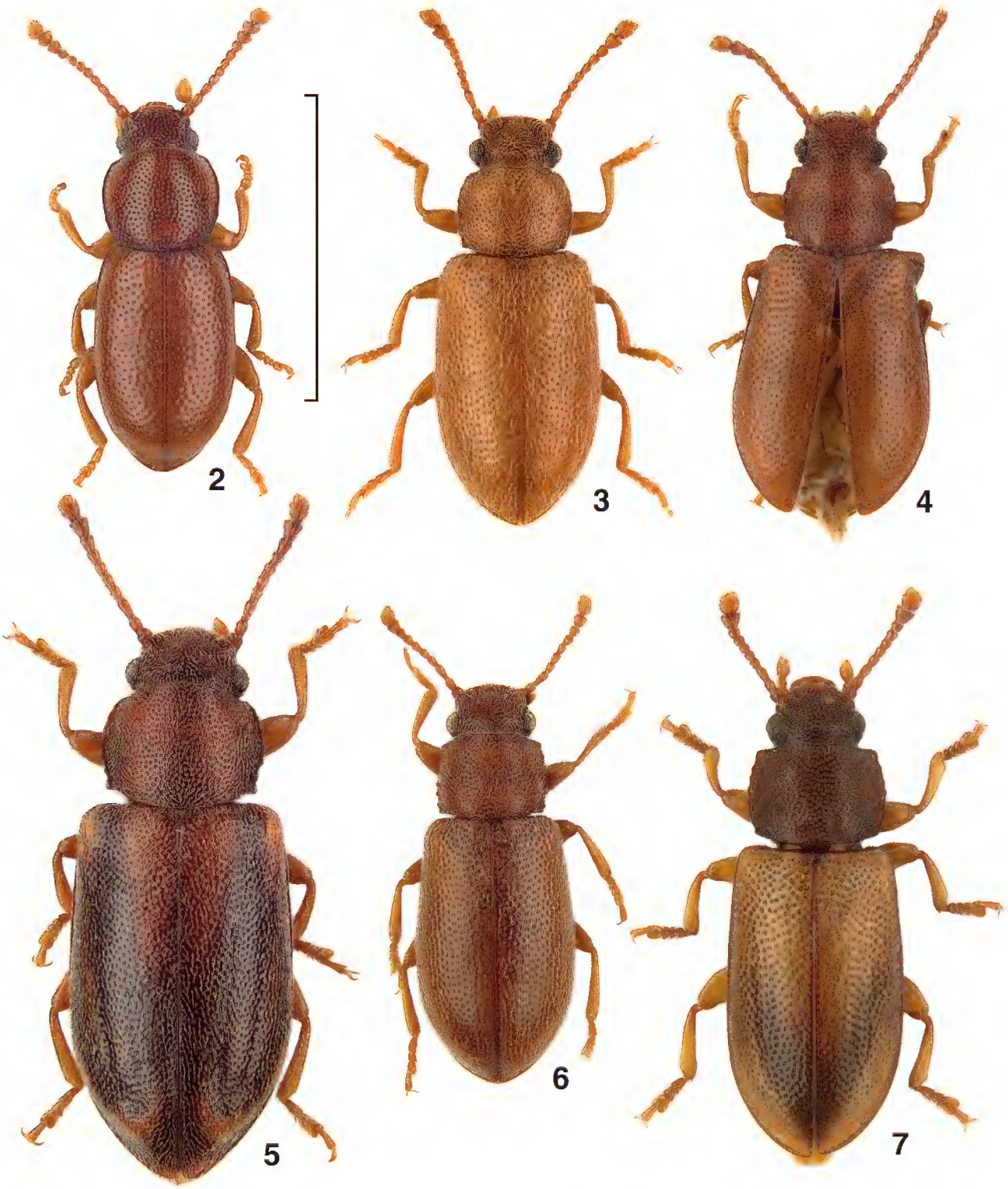
Fig. 1. Collecting localities of *Ardoiniellus montanus* n. gen., n. sp. and *Enicmosoma* species in southern Africa.

Enicmosoma peteri **n. sp.**
(Figs. 7, 20)

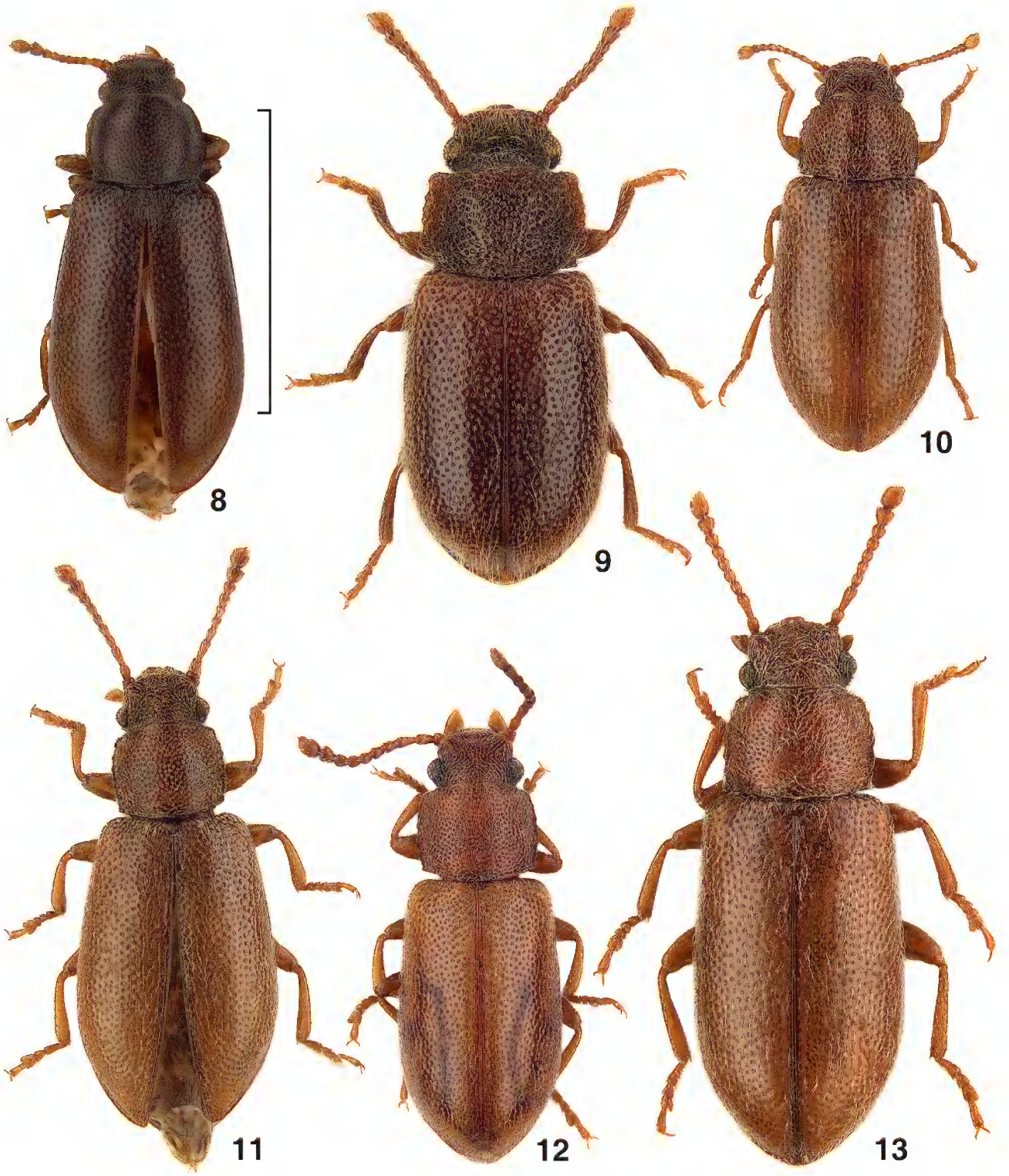
Holotype (♂): South Africa, Eastern Cape (labelled as Transkei), 12 km SE Wilovale, 14.XII.1979, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 2 ex. TMSA, 2 ex. SMNS. – South Africa, Eastern Cape (labelled as Transkei), Ntsubane Forest, 24.XI.1988, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, KwaZulu-Natal, Vryheid, 29.–31.XII.2008, leg. P. Schüle, 1 ex. SMNS. – South Africa, Limpopo (labelled as Transvaal), Motlakeng, Blouberg, 5000–6000 ft., 6.–15.I.1955, Transvaal Museum Expedition, 2 ex. TMSA, 1 ex. SMNS.

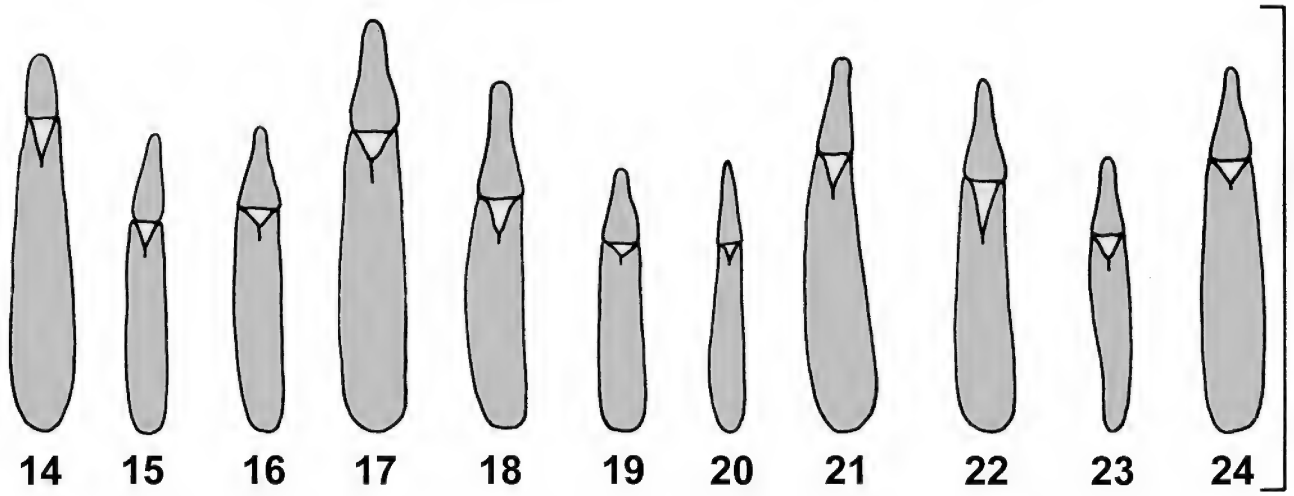
Etymology: Named in honour of Peter Schüle (Herrenberg), specialist of Carabidae, who collected part of the type series.



Figs. 2–7. Dorsal views of *Ardoiniellus* and *Enicmosoma* spp. – **2**. *Ardoiniellus montanus* n. gen., n. sp., ♂ holotype TMSA. **3**. *Enicmosoma amatolensis* n. sp., ♂ holotype TMSA. **4**. *E. capensis* n. sp., ♀ paratype SMNS. **5**. *E. danieli* n. sp., ♂ paratype SMNS. **6**. *E. hararensis* n. sp., ♂ paratype SMNS. 7. *E. peteri* n. sp., ♂ paratype SMNS. – Scale: 2 mm.



Figs. 8–13. Dorsal views of *Enicmosoma* spp. – **8**. *E. proteacola* n. sp., ♂ paratype SMNS. **9**. *E. ruthae* n. sp., ♂ holotype TMSA. **10**. *E. sebastiani* n. sp., ♂ paratype SMNS. **11**. *E.* sp., ♀ TMSA. **12**. *E. swartbergensis* n. sp., ♂ holotype TMSA. **13**. *E. freyi*, ♀ holotype NHMB. – Scale: 2 mm.



Figs. 14–24. Aedeagi of *Ardoiniellus* and *Enicmosoma* spp. – **14**. *Ardoiniellus montanus* n. gen., n. sp., ♂ holotype TMSA. **15**. *Enicmosoma amatolensis* n. sp., ♂ holotype TMSA. **16**. *E. capensis* n. sp., ♂ holotype TMSA. **17**. *E. danieli* n. sp., ♂ holotype TMSA. **18**. *E. freyi*, ♂ non-type SMNS. **19**. *E. hararensis* n. sp., ♂ holotype NHMB. **20**. *E. peteri* n. sp., ♂ holotype TMSA. **21**. *E. proteacola* n. sp., ♂ holotype TMSA. **22**. *E. ruthae* n. sp., ♂ holotype TMSA. **23**. *E. sebastiani* n. sp., ♂ holotype TMSA. **24**. *E. swartbergensis* n. sp., ♂ holotype TMSA. – Scale: 1 mm.

Description: Body length 3.0–3.5 mm. Dorsal and ventral surfaces and all appendages dark brown without metallic shine, in one specimen basal part of elytra distinctly lighter; dorsal and ventral surfaces punctured, punctures with very small adpressed, pale setae, surface between punctures dull (Fig. 7). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, without transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 7, antennomere 3 feebly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners slightly marked but not prominent or acute, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation smaller and sparser than on pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 20) with long basale and narrow elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by larger body size (more than 3.0 mm in the average), unicoloured light brown surface or sometimes with lighter basal part of the elytra, antennomere 3 only feebly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with rounded, distinctly crenulate lateral margins and slightly marked anterior corners, dull surface of elytra between punctures, shorter elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 20). For separation from the other species from southern Africa see the key below.

Biological data: Collected from inflorescences of cabbage tree, and from rotten *Cussonia* fruit.

Enicmosoma proteacola **n. sp.**
(Figs. 8, 21)

Holotype (♂): South Africa, Eastern Cape (labelled as Capland), Willowmore, 1.VIII.1916, leg. H. Brauns, TMSA.

Paratypes: Same data as holotype, 16 ex. TMSA, 4 ex. SMNS.

Etymology: Named after the shrub genus *Protea*, in whose blossoms the type series was collected.

Description: Body length 2.8–3.3 mm. Dorsal and ventral surfaces and all appendages dark brown without metallic shine; dorsal and ventral surfaces punctured, punctures with shorter adpressed, pale setae, surface between punctures shining (Fig. 8). Head with punctation similarly coarse and partly confluent as on pronotum; genae some-

what swollen but not dilated, with a feeble transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 8, antennomere 3 of similar length as antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but slightly crenulate, anterior corners rounded, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head and elytra, propleura with punctation and setation similar to that of pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 21) with long basale and elongate triangular apicale with knob-like rounded tip.

Diagnosis: To be recognized by medium body size (around 3.0 mm in the average), unicoloured dark brown surface, antennomere 3 not longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with rounded, slightly crenulate lateral margins and rounded anterior corners, shining surface of elytra between punctures, shorter elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 21). For separation from the other species from southern Africa see the key below.

Biological data: Collected from calyx of *Protea*.

Enicmosoma ruthae **n. sp.**
(Figs. 9, 22)

Holotype (♂): South Africa, Western Cape, Alexandria Forest Station, 4.–6.XII.1987, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 5 ex. TMSA. – South Africa, Western Cape, Houtbaai, Tierbos, XII.1960, leg. N. Leleup, 16 ex. TMSA. – South Africa, Western Cape, Muizenberge, XI.–XII.1960, leg. N. Leleup, 21 ex. TMSA. – South Africa, Western Cape, Table Mountain, Orange Kloof, XII.1960, leg. N. Leleup, 3 ex. TMSA. – South Africa, Western Cape, Kirstenboosch, XI.1960, leg. N. Leleup, 4 ex. TMSA. – South Africa, Western Cape, Cederberg, 500–1100 m, IV.1962, leg. N. Leleup, 1 ex. TMSA. – South Africa, Western Cape, Kirstenboosch Botanical Gardens, 700 ft., 4.–7.I.1985, leg. C. E. Griswold, 2 ex. TMSA. – South Africa, Western Cape, Hawequas, 5.XI.1973, leg. S. Endrödy-Younga, 6 ex. TMSA. – South Africa, Western Cape, Geelbek Forestry, 25.VIII.1983, leg. S. Endrödy-Younga & M. L. Penrith, 1 ex. TMSA. – South Africa, Western Cape, Cederberg, Jeep track, 1380 m, 1.IX.1981, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, Western Cape, Cederberg, Jeep track, 1130 m, 7.XI.1983, leg. S. Endrödy-Younga, 32 ex. TMSA, 10 ex. SMNS, 5 ex. NHMB. – South Africa, Little Karroo, E Raubenheimer Dam, 21.X.1993, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, Western Cape, Nuwedam Farm, 30.VIII.1981, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, Western Cape, 10 km NE Gansbaai, 27.VIII.1983, leg. S. Endrödy-Younga & M. L. Penrith, 1 ex. TMSA. – South Africa, Western Cape, Brackfontein Farm, 23.VIII.1983, leg. S. Endrödy-Younga & M. L. Penrith, 1 ex. TMSA. – South Africa, Western Cape, Nortier Farm, 25.VIII.1983, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, Western Cape, Bookram Farm, 30.VIII.1981, leg. S. Endrödy-Younga, 3 ex. TMSA. – South Africa, Western Cape, Arniston, dunes, 29.VIII.1983, leg. S. Endrödy-Younga & M. L. Penrith, 1 ex. TMSA. – South Africa, Western Cape, Cederberg, Devil's Kloof, 850 m, 9.XI.1983, leg. S. Endrödy-Younga, 1 ex. TMSA. – South Africa, Western Cape, Cederberg, Elandskloof, 820 m, 17.XI.2007, leg. E. Colonelli, 1 ex. SMNS.

Etymology: Named in honour of Ruth Müller (Pretoria), collection manager of the Ditsong National Museum of Natural History Pretoria for various support and hospitality during joint fieldwork and comparative studies of the author in Pretoria.

Description: Body length 2.5–3.5 mm. Dorsal and ventral surfaces and all appendages dark brown without metallic shine, in some specimens basal and lateral parts of elytra indistinctly lighter; dorsal and ventral surfaces punctured, punctures with long erect, pale setae, surface between punctures shining (Fig. 9). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, with distinct transverse impression between genae; anterior margin of clypeus straight and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 9, antennomere 3 feebly longer than antennomere 2, terminal 2 antennomeres forming loose club, terminal antennomere feebly bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners distinctly prominent but not acute, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head but slightly larger and denser than on elytra, propleura with punctation smaller and sparser than on pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 22) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by medium body size (around 3.0 mm in the average), unicoloured dark brown

surface or sometimes basal and lateral parts of elytra lighter, antennomere 3 only feebly longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with nearly parallel, distinctly crenulate lateral margins and prominent anterior corners, shining surface of elytra between punctures, longer elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 22). For separation from the other species from southern Africa see the key below.

Biological data: Collected from humus, by pitfall traps baited with banana or faeces, by shorewashing, sifted at the edge of marsh, sifted from indigenous forest litter, or taken from beneath stones.

Enicmosoma sebastiani **n. sp.**
(Figs. 10, 23)

Holotype (♂): South Africa, Mpumalanga (labelled as Transvaal), Magaliesberg, 8.IV.1973, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 4 ex. TMSA, 2 ex. SMNS.

Etymology: Named in honour of the late Dr. Sebastian Endrödy-Younga (1934–1999), coleopterist in the Hungarian Natural History Museum Budapest, then in the Transvaal Museum Pretoria, who collected not only the type series of this new species, but also material of several congeners.

Description: Body length 2.3–2.8 mm. Dorsal and ventral surfaces and all appendages brown without colour pattern and without metallic shine, some specimens dark brown; dorsal and ventral surfaces punctured, punctures with longer adpressed, pale setae, surface between punctures shining (Fig. 10). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, with weak transverse impression between genae; anterior margin of clypeus straigth and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 10, antennomere 3 distinctly longer than antennomere 2, only terminal antennomere broadened, not bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners rounded, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head but slightly denser than on elytra, propleura with punctation and setation similar to that of pronotum, metasternal punctures larger laterally than medially. Hind wings completely developed. Elytra widest behind middle, lateral margins visible in dorsal view along anterior half of elytra, surface with punctation irregularly arranged in rows, epipleura with punctation large and dense similar to elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 23) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by smaller body size (less than 3.0 mm in the average), unicoloured brown surface, antennomere 3 distinctly longer than 2, antennae 10-segmented with only the terminal antennomere broadened, pronotum with rounded, distinctly crenulate lateral margins and rounded anterior corners, shining surface of elytra between punctures, longer elytral setation, penultimate tarsomeres not broadened, and shape of the aedeagus (Fig. 23). For separation from the other species from southern Africa see the key below.

Remarks: This species differs from the other congeners by the antennae with 10 antennomeres but with only the last antennomere broadened (in all other species 10-segmented with the last 2 antennomeres broadened), and by the penultimate tarsomeres not broadened.

Biological data: Collected from flowering shrubs.

Enicmosoma swartbergensis **n. sp.**
(Figs. 12, 24)

Holotype (♂): South Africa, Western Cape, Swartberge, E Blesberg, 2000 m, 6.XI.1978, leg. S. Endrödy-Younga, TMSA.

Paratypes: Same data as holotype, 1 ex. TMSA, 1 ex. SMNS. – South Africa, Western Cape, Caledon Distr., Revier Sonder End, I.1961, leg. N. Leleup, 2 ex. TMSA.

Etymology: Named after the Swartberge Mountains, where the type series was collected in higher altitudes.

Description: Body length 2.7–3.3 mm. Dorsal and ventral surfaces and all appendages brown without metallic shine, elytra posteriorly with 2 indistinct darker longitudinal stripes; dorsal and ventral surfaces punctured, punctures with small adpressed, pale setae, surface between punctures shining (Fig. 12). Head with punctation similarly coarse and partly confluent as on pronotum; genae somewhat swollen but not dilated, without distinct transverse impression between genae; anterior margin of clypeus straigth and without excavation or other modifications; eyes round and prominent, not enchroached by genae; antennae with 10 antennomeres, shape of the antennomeres as in Fig. 12, antennomere 3 not longer than antennomere 2, terminal 2 antennomeres forming a loose club, terminal antennomere feebly bipartite. Pronotum widest in middle, anterior and posterior margins unbordered, lateral margins unbordered but distinctly crenulate, anterior corners rounded and not marked, posterior corners rectangular; surface convex with punctation irregular, coarse and partly confluent, punctures similar to those of head but slightly denser than on elytra, propleura with punctation smaller and sparser than on pronotum, metasternal punctures larger

laterally than medially. Hind wings reduced, basal parts present. Elytra widest behind middle, lateral margins completely visible in dorsal view, surface with irregular punctation not arranged in rows or striae, epipleura with punctation large and dense, similar to that of elytra. Ventrites with punctures larger laterally than medially, terminal ventrite unbordered. Legs without particular modifications. Aedeagus (Fig. 24) with long basale and elongate triangular apicale with rounded tip.

Diagnosis: To be recognized by medium body size (around 3.0 mm in the average), brown surface with darker colour pattern on elytra, antennomere 3 not longer than 2, antennae 10-segmented with the 2 last antennomeres broadened, pronotum with nearly parallel, distinctly crenulate lateral margins and rounded anterior corners, shining surface of elytra between punctures, longer elytral setation, penultimate tarsomeres broadened, and shape of the aedeagus (Fig. 24). For separation from the other species from southern Africa see the key below.

Biological data: Collected by sweeping grass.

Enicmosoma sp.
(Fig. 11)

Material: South Africa, KwaZulu-Natal, Tongaat beach, 18.–30.I.1992, leg. S. Endrödy-Younga, 1 ♀, 1 damaged ex. TMSA.

Remarks: The material is too poor to decide whether it represents an additional new species or if it belongs to *E. proteacola* n. sp. (but the two specimens have longer dorsal setation, longer antennomere 3 and flatter pronotum than *E. proteacola* n. sp.).

Biological data: Collected from coastal shrub.

3 Key to the species of *Enicmosoma* in southern Africa

1 Antennomere 3 not elongate, or at most slightly longer than antennomere 2 ..... **2**
– Antennomere 3 elongate, distinctly longer than antennomere 2. ..... **6**
2 Pronotum transverse, maximum width nearly equal to width of elytral basis, with distinctly prominent anterior corners. – Figs. 9, 22 ..... ***E. ruthae* n. sp.**
– Pronotum subquadrate, maximum width narrower than width of elytral basis, with slightly marked or rounded anterior corners **3**
3 Surface of pronotum and elytra between punctures dull, dorsal setae shorter than puncture diameter, body larger in the average (3.0–3.5 mm), elytra 1.8 times as long as broad. – Figs. 7, 20 ..... ***E. peteri* n. sp.**
– Surface at least on elytra between punctures shining, dorsal setae slightly or distinctly longer than puncture diameter, body smaller in the average (2.3–3.3 mm), elytra 1.6–1.7 times as long as broad **4**
4 Pronotum convex, surface slightly dull and chagreened between punctures, lateral margins only slightly crenulate; dorsal setae of elytra only slightly longer than puncture diameter. – Figs. 8, 21 ..... ***E. proteacola* n. sp.**
– Pronotum nearly flat, surface shining between punctures, lateral margins distinctly crenulate; dorsal setae of elytra distinctly longer than puncture diameter. **5**
5 Pronotum with rounded anterior corners, body larger in the average (2.7–3.3 mm), elytra with darker longitudinal stripes; wingless species from high altitude mountain habitats. – Figs. 12, 24 ..... ***E. swartbergensis* n. sp.**
– Pronotum with slightly marked anterior corners, body smaller in the average (2.3–2.8 mm), elytra brown without dark patterns; species with wings from lowland habitats. – Figs. 4, 16. ..... ***E. capensis* n. sp.**
6 Antennae 10-segmented with only the terminal antennomere broadened, penultimate tarsomeres not broadened, elytral setation arranged in longitudinal rows. – Figs. 10, 23 ..... ***E. sebastiani* n. sp.**
– Antennae 10-segmented with compact 2-segmented club, penultimate tarsomeres broadened, elytral setation irregular **7**
7 Body larger in the average (3.0–3.5 mm) **8**
– Body smaller in the average (2.5–3.0 mm). **9**
8 Punctures of pronotum and elytra sparser, on elytra interspaces between punctures distinctly wider than puncture diameter, dorsal setation longer, body unicoloured light brown. – Figs. 13, 18 ..... ***E. freyi***
– Punctures of pronotum and elytra narrower, on elytra interspaces between punctures as wide as or narrower than puncture diameter, dorsal setation shorter, body dark brown and elytra with darker colour pattern. – Figs. 5, 17. ..... ***E. danieli* n. sp.**
9 Pronotum with nearly parallel lateral margins, lateral margins distinctly crenulate, anterior corners of pronotum slightly marked; Zimbabwe. – Figs. 6, 19 ..... ***E. hararensis* n. sp.**
– Pronotum with rounded lateral margins, lateral margins only slightly crenulate, anterior corners of pronotum completely rounded; Eastern Cape. – Figs. 3, 15. ..... ***E. amatolensis* n. sp.**

4 Complete species list of *Enicmosoma*

amatolensis n. sp.	South Africa
barclayi Ferrer, 2005	Angola
burbonense Ardoin, 1957	La Réunion
cantaloubei Ardoin, 1957	Cameroon, Congo, Uganda, Tanzania
ssp. *guineensis* Ardoin, 1957	French Guinea
capensis n. sp.	South Africa
crassicorne Ardoin, 1958	Madagascar
danieli n. sp.	South Africa
decorsei Ardoin, 1958	Madagascar
ssp. *haafi* Ardoin, 1964	Madagascar
freyi Ardoin, 1964	South Africa
gebieni Ardoin, 1958	Madagascar
hararensis n. sp.	Zimbabwe
insulare Ardoin, 1958	Madagascar
lathridioides Gebien, 1922	Mauritius (Rodriguez)
lineatum Ardoin, 1958	Madagascar
nebulosum Ardoin, 1958	Madagascar
nitens Ardoin, 1958	Madagascar
peteri n. sp.	South Africa

proteacola n. sp.	South Africa
punctatissimum Ardoin, 1958	Madagascar
punctum Gebien, 1922	Seychelles (Mahé)
quadrimaculatum Ardoin, 1958	Madagascar
ruthae n. sp.	South Africa
sebastiani n. sp.	South Africa
swartbergensis n. sp.	South Africa
uncinatum Gebien, 1922	Mauritius (Rodriguez)
vadoni Ardoin, 1958	Madagascar

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The species of *Bradymerus* Perroud (Coleoptera: Tenebrionidae) from New Guinea and the Moluccan Islands, with descriptions of 11 new species[1]

Wolfgang Schawaller

Abstract

The species of the genus *Bradymerus* Perroud (Coleoptera: Tenebrionidae: Cnodalonini) from New Guinea and the Moluccan Islands are revised. The diagnostic characters are described and figured and a species key is provided for 35 (of 37) species from that area. – New species: *B. albertisi* **n. sp.**, *B. archboldi* **n. sp.**, *B. beccarii* **n. sp.**, *B. biroi* **n. sp.**, *B. buergersi* **n. sp.**, *B. cheesmanae* **n. sp.**, *B. dahli* **n. sp.**, *B. dohertyi* **n. sp.**, *B. lorentzi* **n. sp.**, *B. meyeri* **n. sp.**, *B. neuhaussi* **n. sp.** – New synonyms: *B. celebensis* Gebien, 1925 (*B. acutigena* Kulzer, 1951 **n. syn.**), *B. laticollis* Kulzer, 1951 (*B. costulatus* Kaszab, 1980 **n. syn.**), *B. nigerrimus* Gebien, 1922 (*B. keyensis* Kulzer, 1951 **n. syn.**), *B. regularis* Gebien, 1922 (*B. buruensis* Kulzer, 1951 **n. syn.**), *B. wegneri* Kaszab, 1964 (*B. kulzeri* Schawaller, 2006 **n. syn.**); *Planibates* Kaszab, 1939, with its type species *B. papuanus* (Kaszab, 1939) **n. comb.** is considered a junior synonym of *Bradymerus* Perroud, 1864. – Lectotypes are designated for *B. helleri* Gebien, 1922, *B. integer* Gebien, 1922, *B. kuntzeni* Gebien, 1922, *B. principatus* Gebien, 1922, *B. seriatus* Gebien, 1922 and *B. rugipleuris* Gebien, 1922.

Keywords: Coleoptera, Tenebrionidae, Cnodalonini, New Guinea, Moluccan Islands, new species, new synonyms, taxonomy, species key.

Zusammenfassung

Die Arten der Gattung *Bradymerus* Perroud (Coleoptera: Tenebrionidae: Cnodalonini) von Neu Guinea und den Molukken werden revidiert. Die diagnostischen Merkmale werden beschrieben und abgebildet, und ein Bestimmungsschlüssel für 35 (von 37) Arten der Region wird erstellt. – Neue Arten: *B. albertisi* **n. sp.**, *B. archboldi* **n. sp.**, *B. beccarii* **n. sp.**, *B. biroi* **n. sp.**, *B. buergersi* **n. sp.**, *B. cheesmanae* **n. sp.**, *B. dahli* **n. sp.**, *B. dohertyi* **n. sp.**, *B. lorentzi* **n. sp.**, *B. meyeri* **n. sp.**, *B. neuhaussi* **n. sp.** – Neue Synonyme: *B. celebensis* Gebien, 1925 (*B. acutigena* Kulzer, 1951 **n. syn.**), *B. laticollis* Kulzer, 1951 (*B. costulatus* Kaszab, 1980 **n. syn.**), *B. nigerrimus* Gebien, 1922 (*B. keyensis* Kulzer, 1951 **n. syn.**), *B. regularis* Gebien, 1922 (*B. buruensis* Kulzer, 1951 **n. syn.**), *B. wegneri* Kaszab, 1964 (*B. kulzeri* Schawaller, 2006 **n. syn.**); *Planibates* Kaszab, 1939 mit der Typusart *B. papuanus* (Kaszab, 1939) **n. comb.** wird als jüngeres Synonym von *Bradymerus* Perroud, 1864 betrachtet. – Lectotypen werden festgelegt für: *B. helleri* Gebien, 1922, *B. integer* Gebien, 1922, *B. kuntzeni* Gebien, 1922, *B. principatus* Gebien, 1922, *B. seriatus* Gebien, 1922, *B. rugipleuris* Gebien, 1922.

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1 Introduction

This contribution is the continuation of the previous publication on the tenebrionid genus *Bradymerus* Perroud, 1864 (Schawaller 2006). In the latter paper, all species from the Oriental Region were revised, in the present contribution all species from New Guinea, the Moluccan Islands as well as from New Britain are treated (map see Fig. 1). Not included are the endemic species of the Pacific Islands Fiji and Samoa (Kaszab 1955), as well as from the Solomon Islands (Kaszab 1980), Vanuatu (former New Hebrides) or Palau (Micronesia).

So far, species of *Bradymerus* from New Guinea and the Moluccan Islands have been published by Gebien (1922, 1925), Kaszab (1939, 1964) and Kulzer (1951). During this study, five species turned out to be junior synonyms and 11 species are described herein as new, so now altogether 37 species are known from the area (only 35 species known to the author and included in the key). Distribution of two species of the Papuan fauna is extended to

[1] Contributions to Tenebrionidae, no. 108. – For no. 107 see: Stuttgarter Beiträge zur Naturkunde A, Neue Serie 6 (2013).

Queensland, the Solomon Islands and Samoa respectively (*B. crenatus*, *B. raucipennis*), two species are known also from Vanuatu (*B. lobicollis*, *B. solomonis*), and only two species occur also in Sulawesi (*B. celebensis*, *B. wegneri*).

The classification of the polymorphic genus *Bradymerus* within the tribe Cnodalonini as well as species characters were already discussed by SCHAWALLER (2006). Status and tribal assignment of the genus *Apteromerus* Blair, 1928 with the species *A. convexus* (Fairmaire, 1849) and *A. leopoldi* Gebien, 1935 from the Pacific Islands and New Guinea are still unclear. KASZAB (1955) considered *Apteromerus* Blair, 1928 together with *Scotoderus* Perroud, 1864 as closest relatives of *Bradymerus* Perroud, 1864. The species of *Scotoderus* were revised by KASZAB (1973).

Acronyms of depositories

CAPE Collection ANDREAS PÜTZ, Eisenhüttenstadt
CASH Collection ANDRÉ SKALE, Hof/Saale
CAWW Collection ANDREAS WEIGEL, Wernburg
CKAO Collection Dr. KIYOSHI ANDO, Osaka
CRGT Collection Dr. ROLAND GRIMM, Neuenbürg
CSBC Collection STANISLAV BEČVÁŘ, České Budějovice
BMNH The Natural History Museum, London (MAX BARCLAY)
HNHM Hungarian Natural History Museum, Budapest (Dr. OTTÓ MERKL)
MNB Museum für Naturkunde, Berlin (BERND JÄGER, Dr. MANFRED UHLIG)
MTD Museum für Tierkunde, Dresden (OLAF JÄGER)
NHMB Naturhistorisches Museum, Basel (Dr. EVA SPRECHER, Dr. MICHEL BRANCUCCI †)
NME Naturkundemuseum, Erfurt (MATTHIAS HARTMANN)
NMP National Museum (Department of Entomology), Prague (Dr. JIŘÍ HÁJEK)
SMNS Staatliches Museum für Naturkunde, Stuttgart
ZMAN Zoölogisch Museum, Amsterdam (collection transferred to Leiden) (Dr. BEN BRUGGE)
ZSM Zoologische Staatssammlung, München (Dr. MARTIN BAEHR, Dr. MICHAEL BALKE)

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2 The previously known Papuan and Moluccan species of *Bradymerus*

Bradymerus batjanensis Gebien, 1925

Diagnostic characters: GEBIEN (1925: 554) described this species to be similar to *B. raucipennis*, with somewhat different dorsal structure of pronotum and elytra, and somewhat different structure of the genae. Unfortunately, no figure is given in the original description.

Remarks: Type material was not studied because it is missing in NHMB (FREY collection).

Distribution: Bacan (= Batjan) Island near Halmahera (type locality) (Moluccan Islands).

Bradymerus celebensis Gebien, 1925

Bradymerus acutigena Kulzer, 1951 **n. syn.**

Studied type material: Buru, station 6, 21.–24. IV.1921, leg. L. J. TOXOPEUS, holotype of *B. acutigena* ZMAN (damaged specimen, prothorax and head missing, sex unknown). – S Sulawesi (labelled as Celebes), coll. SCHAUFUSS, ♂ lectotype of *B. celebensis* MNB.

Examined material: Same data as holotype, 1♂ ZMAN (compared with holotype of *B. acutigena* by KASZAB in 1977).

Diagnostic characters: For description and figures see SCHAWALLER (2006) under *B. celebensis*.

Synonymy: Unfortunately, the holotype of *B. acutigena* is quite damaged, but fortunately another male nontype specimen with same data was compared with the holotype by KASZAB in 1977. When comparing these specimens with the lectotype of *B. celebensis* (see SCHAWALLER 2006), no specific differences could be found. Thus, *B. acutigena* Kulzer, 1951 is considered a junior synonym of *B. celebensis* Gebien, 1925.

Distribution: Sulawesi (type locality of *B. celebensis*), Buru (type locality of *B. acutigena*) (Moluccan Islands).

Bradymerus crassimargo Kulzer, 1951 (Fig. 14)

Studied type material: Buru, Wai Eno to Wai Temoen, 700–1000 m, 3.II.1922, leg. L. J. TOXOPEUS, ♀ holotype ZMAN (left elytra missing).

Diagnostic characters: Dorsal view see Fig. 14, dorsal side blackish without metallic shine, body length 10.0 mm. Genae not broader than eyes, frons with weak supraorbital furrows but without distinct supraorbital keels. Last 4 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc flat, with rough and partly confluent punctation; pronotum before base with distinct transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals convex, intervals 1–4, 6, 8 with a row of small granules, intervals 5, 7 keeled. Tibiae externally without distinct keels; modifications of male tibiae unknown (only female available). Aedeagus unknown.

Remarks: Unfortunately, males are unknown, but because this species seems related to *B. papuanus*, the

male anterior tibiae very probably also have a distinct internal tooth before the middle.

Distribution: Buru (type locality) (Moluccan Islands).

Bradymerus crenatus (Pascoe, 1870) (Figs. 16, 40)

Isostira crenata Pascoe, 1870.
Bradymerus granaticollis Fairmaire, 1883 syn.

Examined material: New Britain (labelled as Neubritannien), Ratum, leg. F. Dahl, 4 ex. MNB (*B. granaticollis* det. Gebien). – New Britain (labelled as Bismarck Archipel), Ratum, 1896–1897, leg. F. Dahl, 1 ex. MNB. – Halmahera, Wangonira, 28.III.1995, leg. W. Lorenz, 2 ex. CRGT. – Seram, Air Basar, 6 km E Wahei, 5.XI.1998, leg. S. Bílý, 1 ex. NMP. – Seram, Solea, 12 km SE Wahai, 17.I.–6.II.1997, leg. S. Bílý, 2 ex. SMNS, 1 ex. HNHM. – Seram, 35 km E Pasahari, 24.–30.X.1998, leg. J. Horák, 6 ex. ZSM, 2 ex. SMNS, 1 ex. CRGT. – Mangole Island (W Moluccan Islands), VII.–XII.1977, leg. V. & G. Wegener, 2 ex. NHMB. – West Papua, Raja Ampat Prov., Salawati Island, Kalobo, 24.–28.I.2004, leg. A. Skale, 1 ex. CRGT. – West Papua, Manokwari Prov., Ransiki, Mayuby, 26.–30.IX.1990, leg. A. Riedel, 5 ex. SMNS. – West Papua, Manokwari Prov., Gunung Meja, 200 m, 19.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Cyclops Mts., Sabron, camp 2, 2000 ft., VII.1936, leg. L. E. Cheesman, 1 ex. BMNH. – West Papua, Jayapura, Sentani, Cyclops Mts., 400 m, 19.–21.IX.1990, leg. A. Riedel, 3 ex. SMNS. – West Papua, Jayapura, Sentani, Cyclops Mts., 300–450 m, 31.X.1992, leg. A. Riedel, 7 ex. SMNS. – West Papua, Biak Island, Sepse, 3.X.1990, leg. A. Riedel, 2 ex. SMNS. – West Papua, Biak Island, Adadikam, XII.2006, leg. O. Mehl, 1 ex. HNHM. – West Papua, Sorong, Dusun Meibo, 100–150 m, 19.I.2001, leg. A. Riedel, 1 ex. SMNS. – West Papua, Fakfak, 2 km E airstrip, 16.–18.VII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, Nabire to Mapia, Unipo, 24.VII.1996, leg. P. Schüle & P. Stüben, 3 ex. SMNS. – West Papua, Sorong, 29.IX.–6.X.1992, leg. B. Balázs, 1 ex. HNHM. – West Papua, Japen (labelled as Yapen) Island, Serui, 28.XII.2006 –9.I.2007, leg. S. Bílý, 1 ex. NMP. – West Papua, 130 km SE Kaimana, Omba (= Yamor) river, 10–20 km from coast, 9.–11.II.2011, leg. A. Skale, 1 ex. CASH. – West Papua, road 10 km NE Kaimana, 40 m, 1.II.2011, leg. A. Skale, 2 ex. CASH. – Papua New Guinea, Kapala, Madang, 650–1500 m, no further data, 2 ex. HNHM. – Papua New Guinea, Kokoda, 1200 ft., VIII.–X.1933, leg. L. E. Cheesman, 6 ex. BMNH. – Papua New Guinea, Morobe Prov., Kaiapit, XII.1978, leg. W. G. Ullrich, 1 ex. CKAO. – Papua New Guinea, Karimui, III.1974, leg. J. Sedlacek, 5 ex. HNHM. – Papua New Guinea, Mt. Missim, II.1974, leg. J. Sedlacek, 2 ex. HNHM. – Papua New Guinea, Bulolo, 700 m, II.1974, leg. J. Sedlacek, 1 ex. HNHM.

Diagnostic characters: Dorsal view see Fig. 16, dorsal side blackish without metallic shine, body length 6.3–8.0 mm. Genae distinctly broader than eyes, frons with distinct supraorbital furrows and with distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with rough and confluent punctation, before base with a small medial impunctate field, between punctures with granules; pronotum medially with distinct longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals distinctly convex and regular with complete high keels, keels slightly sinuate. Tibiae externally with distinct keels; male tibiae without modifications. Aedeagus see Fig. 40.

Distribution: Halmahera, Seram, Bacan (= Batjan), Banda, Mangole (all Moluccan Islands); New Guinea, New Britain, Duke of York Island (type locality of *B. granaticollis*); Queensland (type locality of *B. crenatus*); Solomon Islands, Samoa.

Bradymerus doleschalli Kaszab, 1964 (Figs. 4, 50)

Studied type material: Amboina, 1859, leg. L. Doleschall, ♂ holotype and 1 paratype HNHM.

Examined material: Amboina, XI.1923, leg. C. J. Brooks, 1 ex. BMNH. – Amboina, Laihatu, Soya, 11.–12.X.1998, leg. J. Horák, 2 ex. ZSM. – Ambon, VIII.1999, 1 ex. CKAO. – Seram, Air Basar, 6 km E Wahei, 5.XI.1998, leg. S. Bílý, 1 ex. NMP. – Seram, 12 km SE Wahai, Solea, 17.I.–6.II.1997, leg. S. Bílý, 6 ex. CSBC, 5 ex. ZSM, 3 ex. SMNS. – Seram, 12 km SE Wahai, Solea, 16.–21.X.1998, leg. J. Horák, 4 ex. ZSM. – Seram, X.–XI.1909, leg. W. Stalker, 1 ex. BMNH.

Diagnostic characters: Dorsal view see Fig. 4, dorsal side blackish without metallic shine, body length 9.5–11.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc flat, with rough and partly confluent punctation, before base punctures more separate, between punctures with granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals 1–2 distinctly convex and with a row of feeble granules, intervals 3–8 with complete keels. Tibiae externally without distinct keels; anterior male tibiae internally with longitudinal stripe of densely set light setae. Aedeagus see Fig. 50.

Distribution: Amboina island (= Ambon) (type locality), Seram.

Bradymerus helleri Gebien, 1922 (Fig. 5)

Studied type material: Papua New Guinea, Kaiser-Wilhelms-Land, Astrolabe Bay, Bongu, without date, 1 ♀ syntype MTD, here designated as lectotype.

Examined material: Papua New Guinea, Misima (labelled Missima) Island, 250 m, 20.IX.1982, leg. J. Sedlacek, 1 ♀ HNHM.

Diagnostic characters: Dorsal view see Fig. 5, dorsal side blackish without metallic shine, body length 10.8–12.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum protruding, lateral margin with feeble crenulation, pronotal disc flat, with dense but not confluent punctation, before base punctures more separate, between punctures with a few granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals distinctly convex and regular with a row of distinct granules. Tibiae externally without distinct keels; modifications of male tibiae unknown (only females available). Aedeagus unknown.

Remarks: The newly collected female from Misima Island has the dorsal tubercles somewhat smaller than in the female lectotype, all other characters coincide.

Distribution: New Guinea (type locality Bongu) including Misima Island (Louisiade Archipelago).

Bradymerus integer Gebien, 1922
(Figs. 20, 42)

Studied type material: Dammer Island, without date, 1 ♀ syntype NHMB, here designated as lectotype.

Examined material: Dammer (labelled as Damma) Island, without date, leg. J. J. Walker, 1 ex. BMNH, 1 ex. SMNS. – Dammer Island, 3 ex. MNB. – Timor Island, Dilli, 2500 ft., leg. W. Doherty, 2 ex. BMNH. – Timor Island, Faku Lés, leg. W. Doherty, 2 ex. BMNH. – Adonara Island E Flores, leg. W. Doherty, 2 ex. BMNH. – Alor Island, Pura, leg. W. Doherty, 1 ex. BMNH. – Tanimbar (labelled as Tenimber) Island, Jandema, leg. W. Doherty, 2 ex. BMNH. – Buru Island, Ilat, leg. W. Doherty, 3 ex. BMNH. – Admirality Islands, leg. S. Rocholl, 1 ex. HNHM. – Bacan Island, valley 3 km S Labuha, 40 m, 13.I.2006, leg. A. Skale, 3 ex. NME, 1 ex. CRGT. – S Halmahera, 2–3 km N Dolik, 18.–20.I.2006, leg. A. Skale, 1 ex. SMNS. – West Papua, Nusi Island near Biak Island, 12.VIII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, Raja Ampat Prov., Batanta Island, Wallebet, 18.–21.I.2004, leg. A. Skale, 1 ex. CRGT. – Papua New Guinea, Stephansort, Astrolabe Bay, 1900, leg. L. Biró, 2 ex. HNHM. – Papua New Guinea, Morobe Prov., Sattelberg, Huon Golf, 1899, leg. S. Biró, 1 ex. HNHM. – Papua New Guinea, Berlinhafen, Seleo, 1896, leg. L. Biró, 1 ex. HNHM.

Diagnostic characters: Dorsal view see Fig. 20, dorsal side blackish without metallic shine, body length 6.0–6.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with rough and confluent punctation, between punctures with a few granules; pronotum medially with distinct longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals distinctly convex and regular with complete keels, keels slightly sinuate. Tibiae externally without distinct keels; male tibiae without modifications. Aedeagus see Fig. 42.

Remarks: This species is quite similar in external characters and also in the aedeagus to the widespread *B. clathratus* Schaufuss, 1887 (Schawaller 2006: figs. 16, 87), but in *B. integer* the pronotal punctation is rougher and the elytral keels are distinctly higher.

Distribution: Dammer Island NE Timor (type locality), Timor, Adonara, Alor, Buru, Bacan, Halmahera, Admirality Islands, New Guinea including Batanta Island.

Bradymerus kuntzeni Gebien, 1922
(Fig. 19)

Studied type material: Papua New Guinea (labelled as D. N. Guinea), Mäanderberg, 670 m, 19.–31.VII.1913, leg. J. Bürgers, 1 ♀ syntype MNB, here designated as lectotype. – Papua New Guinea (labelled as D. N. Guinea), Mäanderberg, 670 m, 21.–30.VIII.1913, leg. J. Bürgers, 1 ♀ paralectotype MNB.

Examined material: West Papua, Manokwari Prov., Mokwam (Siyoubrig), 1400–1800 m, 24.–28.II.2007, leg. A. Weigel, 1 ♀ CRGT. – West Papua, Manokwari Prov., 18 km NW Ransiki, Anggi Gida, Kampung Itkau, 1890 m, 4.III.2007, leg. A. Weigel, 1 ♀ SMNS.

Diagnostic characters: Dorsal view see Fig. 19, dorsal side blackish without metallic shine, body length 7.5–8.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with dense and partly confluent punctation, before base punctures more separate, between punctures with a few fine granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, all intervals distinctly convex and regular with a row of distinct granules. Tibiae externally without distinct keels; modifications of male tibiae unknown (only females available). Aedeagus unknown.

Distribution: New Guinea (type locality Mäanderberg).

Bradymerus laticollis Kulzer, 1951
(Figs. 17, 43)

Bradymerus costulatus Kaszab, 1980 **n. syn.**

Studied type material: Buru, station 9, 20.VI.–10.VII.1921, leg. L. J. Toxopeus, ♂ holotype of *B. laticollis* ZMAN. – Buru, station 9, 26.IV.–10.VII.1921, leg. L. J. Toxopeus, 9 paratypes of *B. laticollis* ZMAN. – Buru, station 9,

Fig. 1. The investigated area with records of *Bradymerus*: New Guinea including small adjacent islands (Biak, Japen, Waigeo, Salawati, Batanta), New Britain, and the Moluccan Islands (Halmahera, Bacan, Seram, Ambon, Damar, Aru, Kai, Mangole).

20.VI.–10.VII.1921, leg. L. J. Toxopeus, 1 paratype of *B. laticollis* (sex not examined) NHMB.

Examined material: West Papua, Biak Island, Korim, Wouna, 21.–22.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Testega, 1100–1200 m, 11.IV.1993, leg. A. Riedel, 1 ex. SMNS. – Papua New Guinea, Karimui, III.1974, leg. J. Sedlacek, 1 ex. HNHM.

Diagnostic characters: Dorsal view see Fig. 17, dorsal side blackish without metallic shine, body length 7.0–8.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with rough and confluent punctation, between punctures without granules; pronotum medially with longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals distinctly convex and regular with complete keels, keels slightly sinuate. Tibiae externally with distinct keels; male posterior tibiae internally with a fine longitudinal stripe of densely set light setae, male posterior femora ventrally with a small patch of densely set light setae. Aedeagus see Fig. 43.

Synonymy: The description of *B. costulatus* by Kaszab (1980) including the detailed figure shows no specific differences to type material of *B. laticollis*, thus *B. costulatus* Kaszab, 1980 is considered a junior synonym of *B. laticollis* Kulzer, 1951.

Distribution: Buru (type locality of *B. laticollis*) (Moluccan Islands), New Guinea (type locality Wau of *B. costulatus*) including Biak Island, New Britain, Rennell Islands.

Bradymerus lobicollis Gebien, 1922
(Fig. 29)

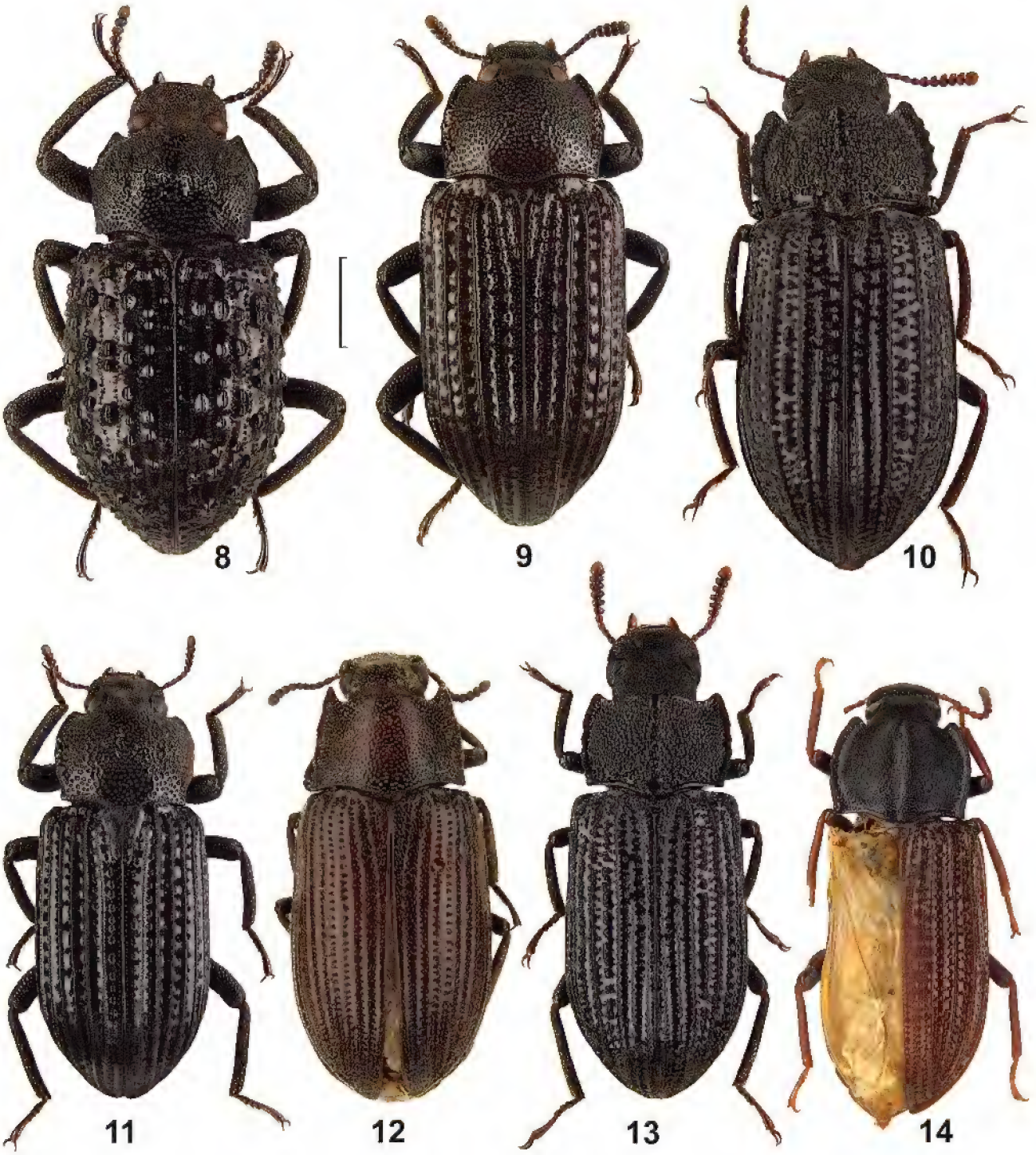
Examined material: Vanuatu (labelled as New Hebrides), Espiritu Santo (labelled as Santo), VIII.–IX.1929, leg. L. E. Cheesman, 2 ex. BMNH, 1 ♀ SMNS.

Diagnostic characters: Dorsal view see Fig. 29, dorsal side blackish without metallic shine, body length 5.8 mm. Genae slightly broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum extremely protruding, lateral margin with feeble crenulation, pronotal disc convex, with rough and confluent punctation, before base punctures more separate, between punctures with high and laterally keeled granules; pronotum before base with shallow transverse impression and medially and on each side with distinct longitudinal impression. Elytra with punctural rows without striae, punctures normally impressed, intervals 1, 2 with distinct elongate granules, intervals 3–8 with distinctly elongate granules partly forming keels. Tibiae externally each with 3 keels; modifications of male tibiae unknown (only female available). Aedeagus unknown.

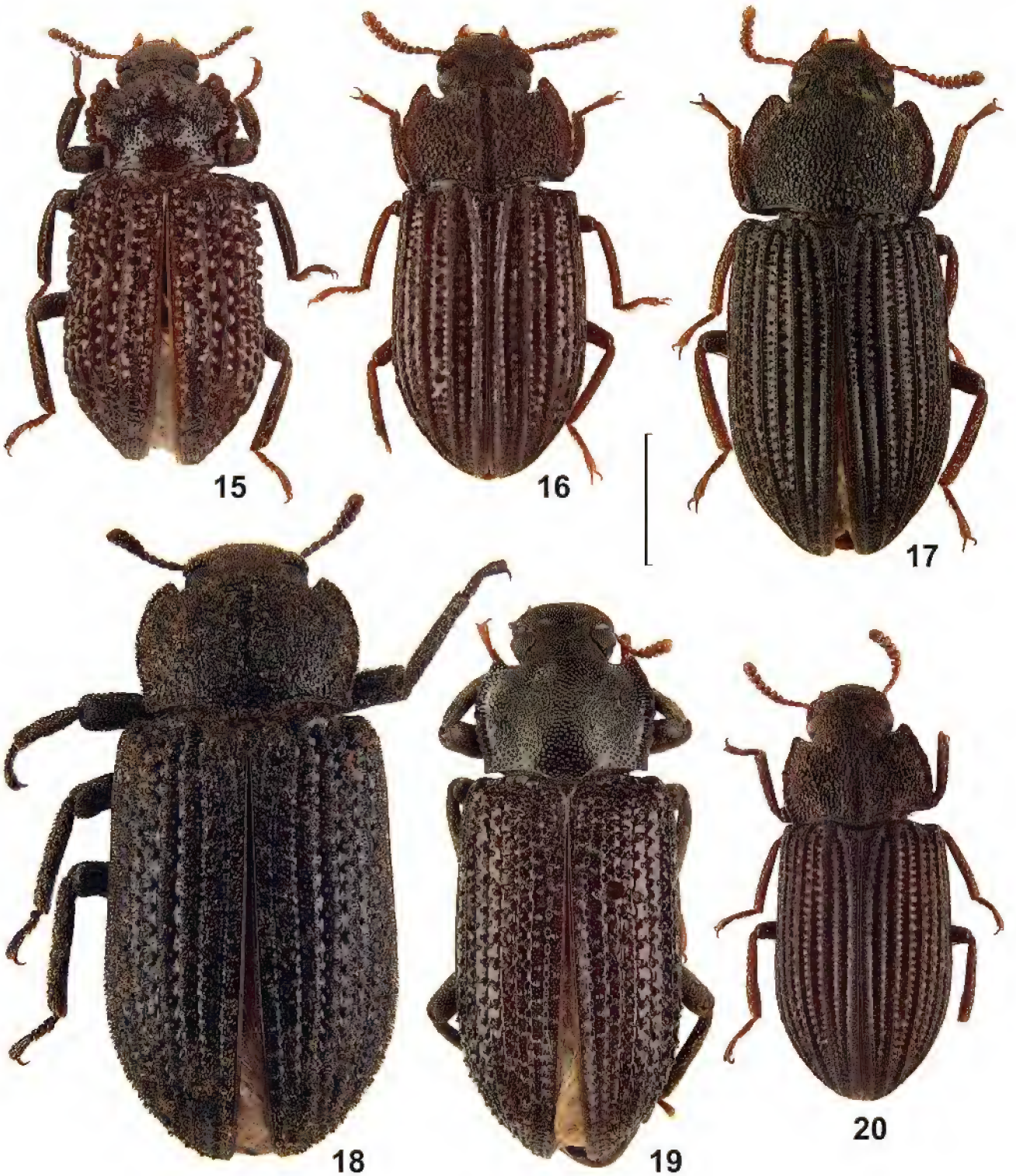
Remarks: The three-keeled tibia is a synapomorphic character occurring also in some species from New Guinea (*B. albertisi* n. sp., *B. cheesmanae* n. sp., *B. meyeri* n. sp.) and from Sulawesi (*B. sprecherae* Schawaller, 2006). – Type material was not studied because it is missing in NHMB (Frey collection).

Distribution: New Guinea (type locality Friedrich Wilhelmshafen, now Madang), Vanuatu (former New Hebrides).

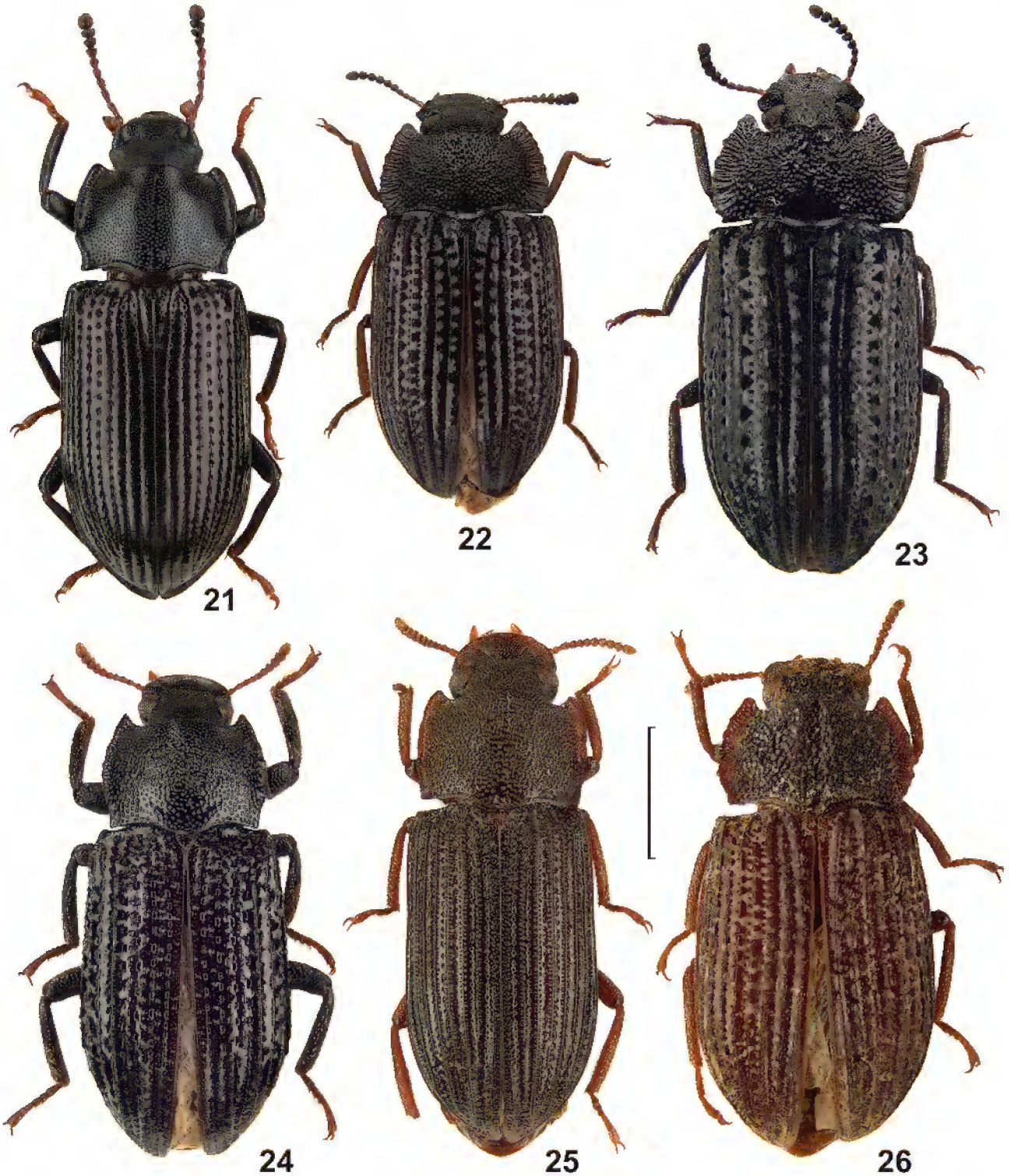
Figs. 2–7. *Bradymerus* spp., dorsal views. – **2**. *B. buergersi* n. sp., ♂ holotype SMNS. **3**. *B. dahli* n. sp., ♀ holotype MNB. **4**. *B. doleschalli*, ♂ holotype HNHM. **5**. *B. helleri*, ♀ lectotype MTD. **6**. *B. macrogonus*, ♂ holotype MTD. **7**. *B. neuhaussi* n. sp., ♀ paratype SMNS. – Scale: 2 mm.



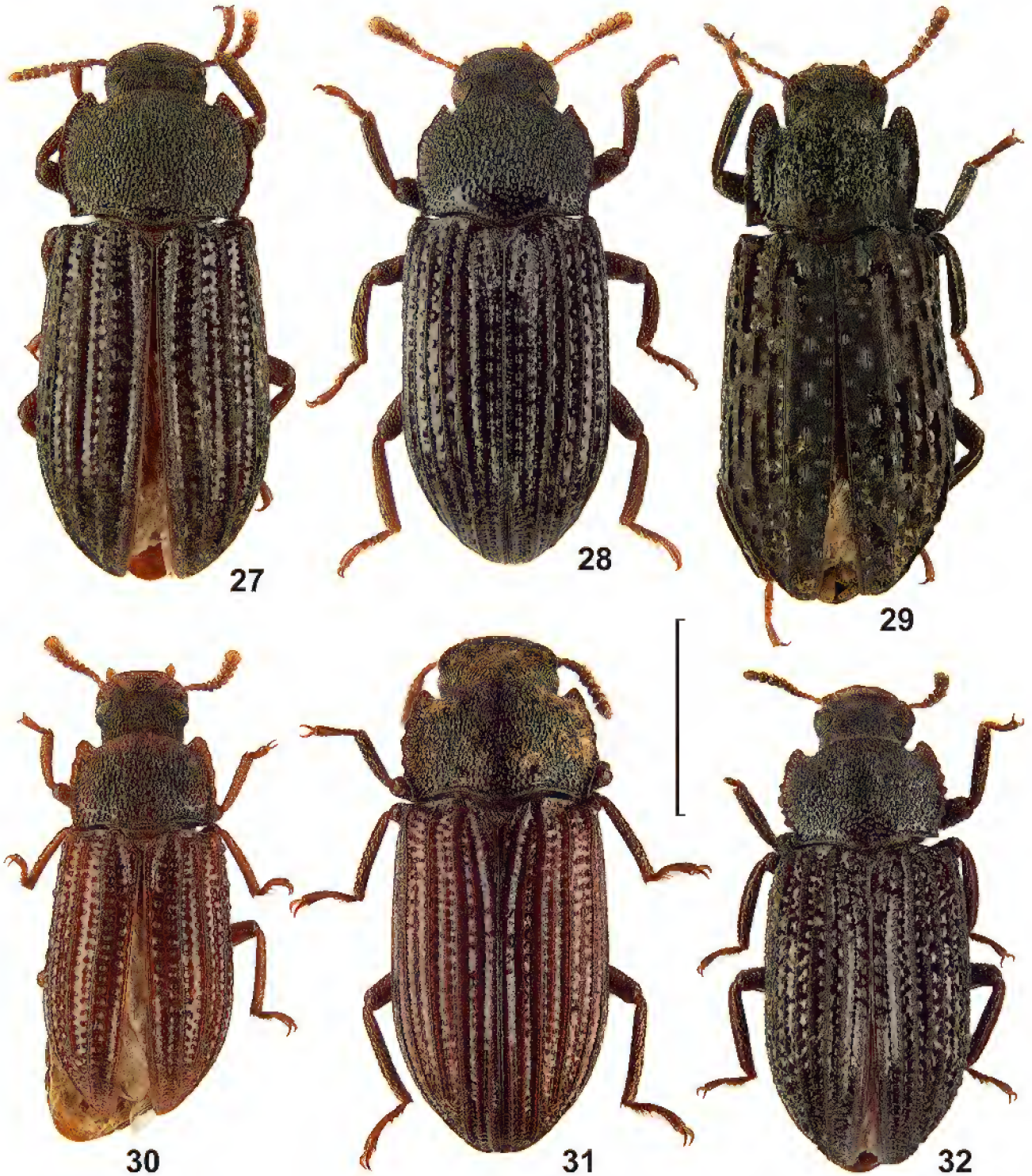
Figs. 8–14. *Bradymerus* spp., dorsal views. – **8**. *B. plicicollis*, ♂ non-type SMNS. **9**. *B. nigerrimus*, ♂ non-type SMNS. **10**. *B. principatus*, ♂ non-type SMNS. **11**. *B. rugipleuris*, ♂ non-type SMNS. **12**. *B. novaeguineense*, ♀ holotype HNHM. **13**. *B. sculptilis*, ♂ non-type SMNS. **14**. *B. crassimargo*, ♀ holotype ZMAN. – Scale: 2 mm.



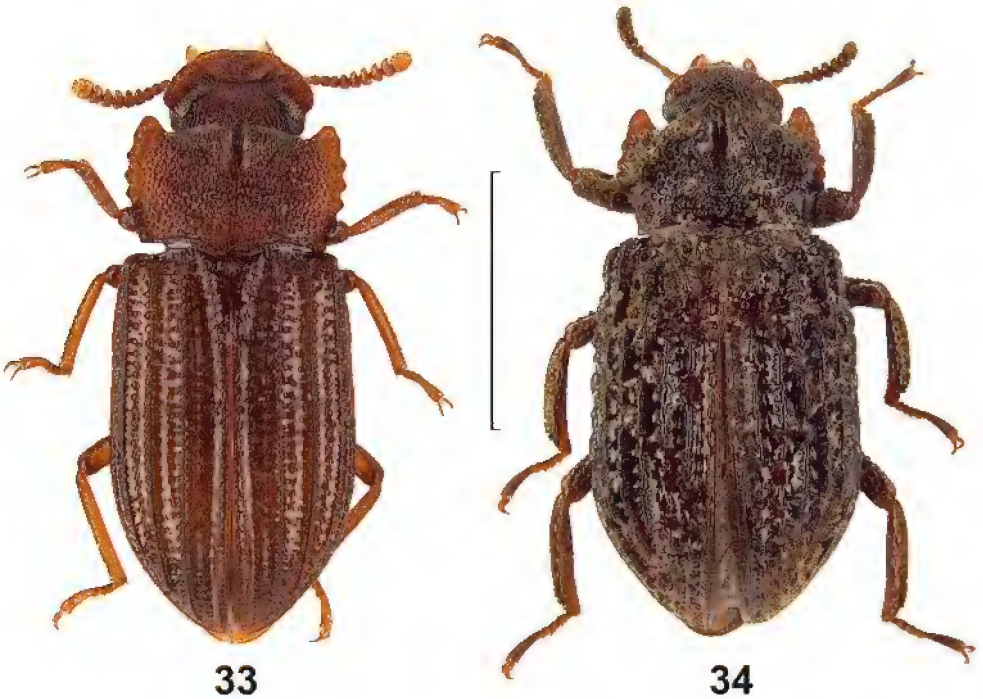
Figs. 15–20. *Bradymerus* spp., dorsal views. – **15**. *B. cheesmanae* n. sp., ♂ holotype SMNS. **16**. *B. crenatus*, ♂ non-type SMNS. **17**. *B. laticollis*, ♂ non-type SMNS. **18**. *B. semiasperatus*, ♂ non-type NHMB. **19**. *B. kuntzeni*, ♀ lectotype MNB. **20**. *B. integer*, ♂ non-type SMNS. – Scale: 2 mm.



Figs. 21–26. *Bradymerus* spp., dorsal views. – **21**. *B. papuanus*, ♂ non-type SMNS. **22**. *B. raucipennis*, ♂ non-type SMNS. **23**. *B. regularis*, ♂ non-type SMNS. **24**. *B. dohertyi* n. sp., ♂ holotype SMNS. **25**. *B. toxopei*, ♂ non-type SMNS. **26**. *B. ternatensis*, ♀ holotype ZMAN. – Scale: 2 mm.



Figs. 27–32. *Bradymerus* spp., dorsal views. – **27**. *B. archboldi* n. sp., ♂ holotype HNHM. **28**. *B. lorentzi* n. sp., ♀ holotype HNHM. **29**. *B. lobicollis*, ♀ non-type SMNS. **30**. *B. beccarii* n. sp., ♂ holotype SMNS. **31**. *B. solomonis*, ♂ paratype HNHM. **32**. *B. albertisi* n. sp., ♂ holotype SMNS. – Scale: 2 mm.



Figs. 33–34. *Bradymerus* spp., dorsal views. – **33**. *B. biroi* n. sp., ♂ holotype SMNS. **34**. *B. meyeri* n. sp., ♀ holotype CRGT. – Scale: 2 mm.

Bradymerus macrogonus Gebien, 1922
(Figs. 6, 51)

Studied type material: Papua New Guinea, Kaiser-Wilhelmsland, Torricelli Mts., 640 m, without date, leg. O. Schlaginhaufen, ♂ holotype MTD.

Diagnostic characters: Dorsal view see Fig. 6, dorsal side blackish without metallic shine, body length 12.3 mm. Genae broader than eyes, frons with distinct supraorbital furrows and with feeble supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base in the middle with a small impunctate field, between punctures with high granules; pronotum medially with longitudinal impression. Elytra with punctural rows without striae, punctures normally impressed, intervals convex and with a row of distinct elongate granules, in intervals 3, 5, 7, 8 granules higher and more confluent, nearly keeled. Tibiae externally with distinct keels; male tibiae without modifications. Aedeagus see Fig. 51.

Remarks: *B. macrogonus* is quite similar to the widespread and common *B. principatus* concerning large body size, dorsal structure and shape of pronotum, as well as elytral structure (compare Figs. 6, 10), but differs by the genae distinctly broader than eyes, the antennae with the last 5 antennomeres forming a club, the tibiae with distinct external keels, and the different aedeagus (Figs. 51, 56). See also under *B. buergersi* n. sp. and *B. neuhaussi* n. sp.

Distribution: New Guinea (type locality Torricelli Mts.).

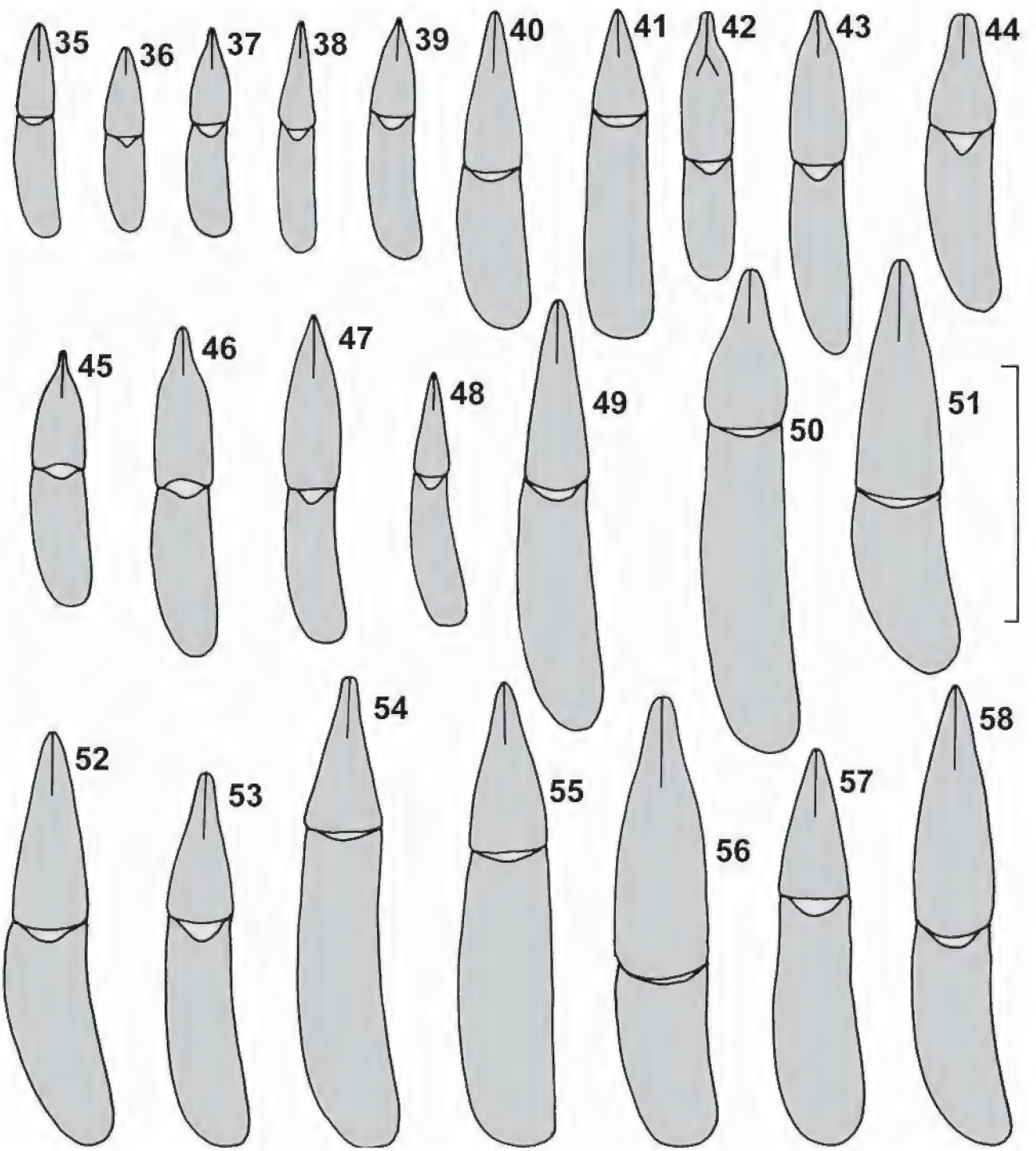
Bradymerus nigerrimus Gebien, 1922
(Figs. 9, 54)

Bradymerus keyensis Kulzer, 1951 **n. syn.**

Studied type material: Papua New Guinea (labelled as D. N. Guinea), But II, 1910, leg. H. Schoede, holotype of *B. nigerrimus* (sex not examined) MNB. – Key Islands, 1 ♀ paratype of *B. keyensis* NHMB.

Examined material: Papua New Guinea, Sorono, leg. L. M. D'Albertis, 1 ex. NHMB (det. Gebien). – West Papua, Fakfak, 2 km E airstrip, 16.–18.VII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, Waigeo Island, Yembekaki, 180 m, 20.–23.I.2001, leg. A. Riedel, 2 ex. SMNS. – West Papua, Nabire Distr., Mt. Botak near Kwatisore, 150 m, VIII.1998, leg. M. Wendesi, 1 ex. CRGT. – Key Islands, 1 ex. HNHM. – Key Islands, 10 km W Tual, Ohoidertawun, 17.–20.II.2011, leg. A. Skale & A. Weigel, 6 ex. NME, 2 ex. CASH, 2 ex. CRGT, 2 ex. SMNS. – Aru Islands, Wokam Island, Samang, 15.II.2011, leg. A. Weigel, 1 ex. NME.

Diagnostic characters: Dorsal view see Fig. 9, dorsal side blackish without metallic shine, body length 9.5–12.8 mm. Genae not broader than eyes, frons with dis-



Figs. 35–58. *Bradymerus* spp., aedeagi. – **35**. *B. albertisi* n. sp., ♂ holotype SMNS. **36**. *B. archboldi* n. sp., ♂ holotype HNHM. **37**. *B. beccarii* n. sp., ♂ holotype SMNS. **38**. *B. biroi* n. sp., ♂ holotype SMNS. **39**. *B. cheesmanae* n. sp., ♂ holotype SMNS. **40**. *B. crenatus*, ♂ non-type SMNS. **41**. *B. dohertyi* n. sp., ♂ holotype SMNS. **42**. *B. integer*, ♂ non-type SMNS. **43**. *B. laticollis*, ♂ holotype ZMAN. **44**. *B. papuanus*, ♂ non-type SMNS. **45**. *B. raucipennis*, ♂ non-type SMNS. **46**. *B. regularis*, ♂ non-type SMNS. **47**. *B. toxopei*, ♂ non-type SMNS. **48**. *B. solomonis*, ♂ paratype HNHM. **49**. *B. buergersi* n. sp., ♂ holotype SMNS. **50**. *B. doleschalli*, ♂ holotype HNHM. **51**. *B. macrogonus*, ♂ holotype MTD. **52**. *B. neuhaussi* n. sp., ♂ holotype SMNS. **53**. *B. semiasperatus*, ♂ non-type NHMB. **54**. *B. nigerrimus*, ♂ non-type NHMB. **55**. *B. plicicollis*, ♂ non-type SMNS. **56**. *B. principatus*, ♂ non-type SMNS. **57**. *B. rugipleuris*, ♂ non-type SMNS. **58**. *B. sculptilis*, ♂ paratype NHMB. – Scale: 1 mm.

tinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc flat, with dense and partly confluent punctation, before base punctures more separate, between punctures without granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals 1–2 distinctly convex and with a row of feeble granules, intervals 3–8 with complete and slightly sinuate keels. Tibiae externally without distinct keels; anterior male tibiae internally with two narrow longitudinal stripes of densely set light setae. Aedeagus see Fig. 54.

Synonymy: *B. keyensis* Kulzer, 1951 is considered as junior synonym of *B. nigerrimus* Gebien, 1922 because the reexamined type material of both taxa shows no distinct specific differences. Kulzer (1951) separated them mainly by the shape of the antennomeres, which cannot be verified by the present author.

Distribution: New Guinea (type locality But of *B. nigerrimus*) including Waigeo Island, Key Islands (type locality of *B. keyensis*), Aru Islands.

Bradymerus novaeguineense Kaszab, 1939 (Fig. 12)

Studied type material: Papua New Guinea, Friedrich Wilhelmshafen, 1901, leg. L. Biró, ♀ holotype HNHM.

Diagnostic characters: Dorsal view see Fig. 12, dorsal side blackish without metallic shine, head, pronotum and elytra with short light setae, body length 9.8 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with dense but not confluent punctation, between punctures without granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, all intervals distinctly convex and without granules or keels. Tibiae externally without distinct keels; modifications of male tibiae unknown (only female available). Aedeagus unknown.

Remarks: The generic assignment of this species is doubtful, because its general habitus has a somewhat intermediate position between *Bradymerus* and the related genus *Scotoderus* Perroud, 1864. However, the pronotum is without deep basal furrow which is a main characteristic of *Scotoderus* (Kaszab 1973). Unfortunately, the holotype is a female, and the aedeagi of the *Scotoderus* species are unknown, thus the aedeagi cannot be taken into consideration for generic assignment.

Distribution: New Guinea (type locality Friedrich Wilhelmshafen, now Madang).

Bradymerus papuanus (Kaszab, 1939) **n. comb.** (Figs. 21, 44)

Planibates papuanus Kaszab, 1939.

Examined material: West Papua, Testega, Meydoudga, 1100–1350 m, 10.IV.1993, leg. A. Riedel, 3 ex. SMNS. – West Papua, Testega, 1100–1300 m, 30.III.–12.IV.1993, leg. A. Riedel, 4 ex. SMNS. – West Papua, 50 km S Nabire, Pusppenssat, 750 m, 31.XII.1997, leg. A. Weigel, 1 ex. CRGT.

Diagnostic characters: Dorsal view see Fig. 21, dorsal side blackish without metallic shine, body length 7.0–8.5 mm. Genae not broader than eyes, frons with weak supraorbital furrows but without distinct supraorbital keels. Last 4 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc flat, with dense but not confluent punctation, disc medially with longitudinal impunctate stripe, between punctures without granules; pronotum before base with distinct transverse impression. Elytra with punctural rows with striae, punctures normally impressed, internal intervals flat, external intervals convex, intervals sometimes with traces of small granules. Tibiae externally without distinct keels; male anterior tibiae with distinct internal tooth before the middle. Aedeagus see Fig. 44.

Synonymy: Kaszab (1939) described the genus *Planibates*, based on the type species *P. papuanus* Kaszab, 1939. The modified anterior tibia in males was regarded by him as the main diagnostic character for *Planibates*. However, this character is not generic and occurs also in some species of *Bradymerus* (Schawaller 2006). All other characters coincide. Thus, *Planibates* Kaszab, 1939 is considered a junior synonym of *Bradymerus* Perroud, 1864. *Planibates aeneus* Kaszab, 1980 and *P. fukiensis* Kaszab, 1954 were already transferred to *Bradymerus* by Schawaller (2006). Probably, also the genus *Calabosca* Fairmaire, 1894 (type species *pedinoides* Fairmaire, 1893 from Indochina) is synonymous with *Bradymerus*.

Distribution: New Guinea (type locality Simbang).

Bradymerus plicicollis (Fairmaire, 1896) (Figs. 8, 55)

Osdara plicicollis Fairmaire, 1896.

Examined material: Papua New Guinea (labelled as D. N. Guinea), Morobe Prov., Sattelberg, XII.1908, leg. R. Neuhauss, 8 ex. MNB. – Papua New Guinea, Huon Golf, Sattelberg,

1899, leg. L. Biró, 15 ex. HNHM. – Papua New Guinea (labelled as D. N. Guinea), Wareo, coll. Hauser, 3 ex. MNB. – Papua New Guinea, Eastern Highlands Prov., Okapa, 5000 ft., 4.–15. II.1965, collector unknown, 1 ex. BMNH. – Papua New Guinea, Kiunga, 23.VII.–2.VIII.1969, leg. J. Balogh, 2 ex. HNHM. – Papua New Guinea, Karimui, 1000 m, V.1969, leg. H. Ohlmus, 1 ex. HNHM. – Papua New Guinea, Karimui, III.1974, leg. J. Sedlacek, 2 ex. HNHM. – Papua New Guinea, Morobe Prov., Gurakor, 16.IX.1979, leg. W. G. Ullrich, 1 ex. HNHM. – Papua New Guinea, Morobe Prov., Aseki, 14.–16.II.1999, collector unknown, 10 ex. CKAO. – Papua New Guinea, Eastern Highlands Prov., Okapa, II.2003, collector unknown, 1 ex. CKAO. – Papua New Guinea, Western Highland Prov., Bayer Valley, Rokina, 1500 m, IV.1979, leg. W. G. Ullrich, 3 ex. HNHM. – West Papua, Jayawijaya Prov., Bommela, 1750 m, 30.VIII.–1.IX.1992, leg. A. Riedel, 2 ex. SMNS. – West Papua, Jayawijaya Prov., Endoman, 900–1200 m, 29.IX.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Wandammen Bay, Wasior, km 38, Sararti, 100–200 m, 7.–9.I.2001, leg. A. Riedel, 3 ex. SMNS. – West Papua, Japen, Mambo, 1000 m, 9.VIII.1996, leg. A. Riedel, 2 ex. SMNS. – West Papua, Fakfak, 2 km E airstrip, 16.–18.VII.1996, leg. P. Schüle & P. Stüben, 5 ex. SMNS. – West Papua, Fakfak, Mambuni to Buni, 11.VII.1996, leg. P. Schüle & P. Stüben, 3 ex. SMNS. – West Papua, Nabire to Mapia, Unipo, 24.VII.1996, leg. P. Schüle & P. Stüben, 2 ex. SMNS. – West Papua, Nabire, Unipo to Ebomani, 9.I.1997, leg. A. Weigel, 2 ex. NME. – West Papua, Testega, 1100–1200 m, 31.III.–12.IV.1993, leg. A. Riedel, 5 ex. SMNS. – West Papua, Manokwari Prov., Ransiki, Mayubi/Benyas, 27.–28. IX.1990, leg. A. Riedel, 2 ex. SMNS. – West Papua, Mokwam, Warmare, 300–1400 m, 19.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Paniai Prov., Mulia, Wuyuneeri, 1900–2200 m, 6.–7.VII.1994, leg. A. Riedel, 40 ex. SMNS. – West Papua, Paniai Prov., Epomani, Ugida, km 179, 1350–1400 m, 19.–20.I.1996, leg. A. Riedel, 1 ex. CRGT, 6 ex. BMNH, 6 ex. NHMB, 6 ex. NME. – West Papua, Baliem Valley, Kanggime, 1550 m, 3.–5. IX.1990, leg. M. Balke & L. Hendrich, 2 ex. CAPE.

Diagnostic characters: Dorsal view see Fig. 8, dorsal side blackish without metallic shine, body length 9.0–12.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc swollen, with dense but not confluent punctation, before base punctures more separate, between punctures with a few granules; pronotum before base with shallow transverse impression and medially and on each side with distinct longitudinal impression, so that the pronotal disc bears 4 humps. Elytra without punctural rows, but with stripes of small but distinct granules, intervals with large, elongate granules. Tibiae externally without distinct keels; male tibiae without modifications. Aedeagus see Fig. 55.

Remarks: This species shows high infraspecific variability, mainly in the shape and dorsal structure of the pronotum, and long or round shape of the elytra. The late Dr. Kaszab tried to sort these different specimens to different taxa and even labelled the form with rounder elytra in different collections as "*pseudoplicicollis*" (manuscript name), but the present author considers all as conspecific.

Distribution: New Guinea (type locality not specified).

Bradymerus principatus Gebien, 1922 (Figs. 10, 56)

Studied type material: Papua New Guinea (labelled as N. Guinea), Friedrich Wilhelmshafen, 1 ♂ syntype NHMB, here designated as lectotype. – Papua New Guinea (labelled as D. N. Guinea), Etappenberg, XI.1912, Kaiserin Augustafluß Expedition, leg. J. Bürgers, 3 paralectotypes MNB. – Papua New Guinea, Lordberg, 8.XII.1912, Kaiserin Augustafluß Expedition, leg. J. Bürgers, 1 paralectotype MNB. – Papua New Guinea, Mäanderberg, 10.–20.VIII.1913, Kaiserin Augustafluß Expedition, leg. J. Bürgers, 1 paralectotype MNB. – Papua New Guinea (labelled as Nieuw Guinea), 15.–19.V.1907, leg. H. A. Lorentz, 1 paralectotype ZMAN.

Examined material: Papua New Guinea, Morobe Prov., Sattelberg, Huon Golf, 1899, leg. L. Biró, 1 ex. SMNS (duplicate from HNHM). – Papua New Guinea, Morobe Prov., Sattelberg, 2 ex. MNB. – Papua New Guinea, Kiunga, 23.VII.–2. VIII.1969, leg. J. Balogh, 7 ex. HNHM. – Papua New Guinea, Mt. Missim, 600–1500 m, II.1974, leg. J. Sedlacek, 1 ex. HNHM. – Papua New Guinea, Bulolo, II.1974, leg. J. Sedlacek, 1 ex. HNHM. – Papua New Guinea, Asiki, 1000 m, II.1974, leg. J. Sedlacek, 1 ex. HNHM. – West Papua, Paniai Prov., Sinak, 2000–2200 m, 14.–17.XII.1995, leg. A. Riedel, 2 ex. CRGT. – West Papua, Cyclops Mts., Mt. Lina, 3500 ft., III.1936, leg. L. E. Cheesman, 1 ex. BMNH. – West Papua, Jayapura, Sentani, Cyclops Mts., 300–1400 m, 10.VIII.1991, leg. A. Riedel, 3 ex. CSBC, 1 ex. SMNS. – West Papua, Fakfak, 2 km E airstrip, 16.–18.VII.1996, leg. P. Schüle & P. Stüben, 2 ex. SMNS. – West Papua, Jayawijaya Prov., Membahan, 23.IX.1991, leg. A. Riedel, 1 ex. SMNS. – West Papua, Jayawijaya Prov., Endoman, 900–1200 m, 29.IX.1993, leg. A. Riedel, 3 ex. SMNS. – West Papua, Jayawijaya Prov., Borme, 1500–2000 m, 13.–17.VIII.1992, leg. A. Riedel, 3 ex. SMNS. – West Papua, Jayawijaya Prov., N Bime, 2000–2070 m, 21.IX.1993, leg. A. Riedel, 8 ex. SMNS. – West Papua, Jayawijaya Prov., Bime, 1600–1900 m, 22.IX.1993, leg. A. Riedel, 2 ex. SMNS. – West Papua, Meydoudga, 1200–1400 m, 5.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Anggi, Tetaho, Iranmeba, 1500–1700 m, 25.III.1993, leg. A. Riedel, 3 ex. SMNS. – West Papua, Anggi, Tetaho, Kosmena, 1400–1750 m, 26.–28.III.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Iba, 1300 m, 7.–8.IV.1993, leg. A. Riedel, 2 ex. SMNS. – West Papua, Testega, 1100–1200 m, 30.III.–11.IV.1993, leg. A. Riedel, 11 ex. SMNS. – West Papua, Paniai, Wuyuneeri, 1900–2200 m, 6.–7. VII.1994, leg. A. Riedel, 7 ex. SMNS. – West Papua, Manokwari Prov., Mokwam, 1300–1600 m, 17.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Manokwari Prov., Mokwam (Siyoubrig), 1400–1800 m, 24.–28.II.2007, leg. A. Weigel, 1 ex. NME. – West Papua, Japen Island, Serui, N Ambeidiru, 1000 m, 5.VIII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS.

Diagnostic characters: Dorsal view see Fig. 10, dorsal side blackish without metallic shine, body length 10.0–13.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct su-

praorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base in the middle with a small impunctate field, between punctures with high granules; pronotum medially with longitudinal impression. Elytra with punctural rows without striae, punctures normally impressed, intervals convex and with a row of distinct elongate granules, in intervals 3, 5, 7, 8 these granules higher and more confluent, nearly keeled. Tibiae externally with distinct keels; male tibiae without modifications, male posterior femora ventrally with a patch of densely set light setae. Aedeagus see Fig. 56.

Remarks: See also under *B. buergersi* n. sp., *B. macrogonus* and *B. neuhaussi* n. sp.

Distribution: New Guinea (type locality Friedrich Wilhelmshafen, now Madang), Japen Island.

Bradymerus raucipennis Blackburn, 1892
(Figs. 22, 45)

Bradymerus seriatus Gebien, 1922 syn.

Studied type material: Papua New Guinea, Mt. Victoria, leg. W. Doherty, 1 syntype (sex not examined) of *B. seriatus* NHMB, here designated as lectotype. – Papua New Guinea, Kaiser Wilhelm Land, Stephansort, XII.1898, leg. S. Rohde, 1 paralectotype of *B. seriatus* MNB. – West Papua (labelled as Holl. N. Guinea), Assewari, 7.VII.1910, leg. S. G. Moszkowski, 1 paralectotype of *B. seriatus* MNB (head and prothorax missing). – New Britain (labelled as Neu Pommern), 1909, 2 paralectotypes of *B. seriatus* MTD. – West Papua, Manokwari, 26.–29.V.1903, 2 paralectotypes of *B. seriatus* ZMAN (1 specimen labelled by Kaszab as lectotype, but designation not published).

Examined material: Australia, Queensland, Clump Point, 19.XII.1952, leg. J. Sedlacek, 1 ex. HNHM. – Australia, Queensland, Coen, 12.III.1997, collector unknown, 1 ex. CRGT. – Halmahera, 7 km S Jailolo, 200 m, 26.–27.I.2006, leg. A. Skale, 1 ex. CRGT. – Key Islands, 1 ex. MNB. – Papua New Guinea, Morobe Prov., Kaiapit, XII.1979, leg. W. G. Ullrich, 1 ex. CKAO. – Papua New Guinea (labelled as D. N. Guinea), Komba Distr., leg. V. Stichel, 3 ex. MNB. – Papua New Guinea, 50 km W Hoger, 1.II.1979, leg. J. Sedlacek, 4 ex. HNHM. – Papua New Guinea, Mt. Missim, 1200 m, 1.II.1974, leg. J. Sedlacek, 1 ex. HNHM. – Papua New Guinea, Milne Bay Prov., Alotau, 14.IX.1982, leg. J. Sedlacek, 2 ex. HNHM. – West Papua, Manokwari Prov., Ransiki, Mayuby, 26.–30.IX.1990, leg. A. Riedel, 4 ex. SMNS. – West Papua, Testega, 1100–1300 m, 30.III.–2.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Testega, 1100–1200 m, 11.IV.1993, leg. A. Riedel, 1 ex. CRGT. – West Papua, Jayapura, Sentani, Cyclops Mts., 300 m, 19.–21.IX.1990, leg. A. Riedel, 1 ex. SMNS. – West Papua, Jayapura, Sentani, Cyclops Mts., 400 m, 13.IX.1990, leg. L. Hendrich, 1 ex. SMNS. – West Papua, N Sentani, 300 m, III.1992, leg. J. Kolibáč, 3 ex. NHMB, 2 ex. SMNS. – West Papua, Japen (labelled as Yapen) Island, Serui, 28.XII.2006 –9.I.2007, leg. S. Bilý, 5 ex. NMP. – West Papua, Japen Island, Mambo, 1000 m, 9.VIII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, Japen (labelled as Yapen) Island, Serui, I.2007, leg. O. Mehl, 4 ex. HNHM. – West Papua, Biak Island, Mniber, XII.2006, leg. O. Mehl, 2 ex. HNHM. – West Papua, road 18 km NE Kaimana, 50–80 m, 21.–25.II.2011, leg. A. Skale, 2 ex. CASH. – West Papua, Raja Ampat Prov., Salawati Island, Kolobo, 24.–28.I.2004, leg. A. Skale, 1 ex. CRGT. – West Papua, Raja Ampat Prov., Batanta Island, Wallebet, 21.I.2004, leg. A. Skale, 1 ex. CRGT. – West Papua, Fakfak, 2 km E airstrip, 16.–18.VII.1996, leg. P. Schüle & P. Stüben, 2 ex. SMNS. – West Papua, Nabire to Mapia, Unipo, km 117, 24.VII.1996, leg. P. Schüle & P. Stüben, 6 ex. SMNS. – West Papua, Nabire Distr., Wondiwoi Mts., Yeretua, 100 m, IX.1998, leg. M. Balke, 1 ex. CRGT.

Diagnostic characters: Dorsal view see Fig. 22, dorsal side blackish without metallic shine, body length 6.0–7.3 mm. Genae distinctly broader than eyes, forming acute angles, frons with distinct supraorbital furrows and with weak supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with dense and partly confluent punctation, before base in the middle with a small impunctate field, between punctures with a few granules; pronotum medially with weak longitudinal impression. Elytra with fine punctural rows without striae, punctures normally impressed, all intervals distinctly convex and regular with a row of distinct granules. Tibiae externally without distinct keels, sometimes anterior tibiae with traces of keels; male tibiae without modifications. Aedeagus see Fig. 45.

Distribution: New Guinea (type locality Mt. Victoria of *B. seriatus*), Japen Island, Biak Island, Salawati Island, Batanta Island, Halmahera (Moluccan Islands), Key Islands, Queensland (Australia) (type locality of *B. raucipennis*).

Bradymerus regularis Gebien, 1922
(Figs. 23, 46)

Bradymerus buruensis Kulzer, 1951 **n. syn.**

Studied type material: Buru, station 9, 20.VI.–10.VII.1921, leg. L. J. Toxopeus, ♂ holotype of *B. buruensis* ZMAN. – Buru, station 9, V.1921, leg. L. J. Toxopeus, 1 ♂ paratype of *B. buruensis* ZMAN. – The holotype of *B. regularis* was not studied because it is missing in NHMB (Frey collection).

Examined material: Papua New Guinea, Arfak Mts., Siwi, 800 m, 4.V.1928, leg. E. Mayr, 1 ex. MNB (det. Kaszab). – Papua New Guinea, Karimui, III.1974, leg. J. Sedlacek, 1 ex. HNHM. – West Papua, Testega, 1100–1200 m, 30.III.–12.IV.1993, leg. A. Riedel, 21 ex. SMNS. – West Papua, 50 km S Nabire, Pusspenssat, 30.XII.1996, leg. A. Weigel, 1 ex. CRGT. – Seram, Solea, 12 km SE Wahai, 17.I.–6.II.1997, leg. S. Bilý, 4 ex. SMNS.

Diagnostic characters: Dorsal view see Fig. 23, dorsal side blackish without metallic shine, body length 6.5–8.0 mm. Genae distinctly broader than eyes, forming

acute angles, frons with distinct supraorbital furrows and with distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with dense and partly confluent punctation, before base in the middle with a large impunctate field, between punctures with several granules; pronotum medially with weak longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals flat, intervals 1, 3, 5, 7 and 9 with a row of distinct elongate granules, posteriorly tubercles confluent and keeled. Tibiae externally with distinct keels; male tibiae without modifications. Aedeagus see Fig. 46.

Synonymy: The reexamined type series of *B. buruensis* completely coincides with the description and figure of *B. regularis* by Gebien (1922). When describing *B. buruensis*, Kulzer (1951) mentioned the similarity to *B. regularis* and separated the two species only by the shape of the high supraorbital keels and by the shape of the broad genae, but these tiny differences are not specific. Thus, *B. buruensis* Kulzer, 1951 is considered a junior synonym of *B. regularis* Gebien, 1922.

Distribution: New Guinea (type locality Mt. Victoria of *B. regularis*); Buru (type locality of *B. buruensis*), Seram (Moluccan Islands).

Bradymerus rugipleuris Gebien, 1922
(Figs. 11, 57)

Studied type material: Great Banda Island (S Seram), 1 ♂ syntype NHMB, here designated as lectotype.

Examined material: Bacan Island, valley 3 km S Labuha, 40 m, 13.I.2006, leg. A. Weigel, 1 ex. SMNS. – Morotai Island, W Daruba, Raja, 50–300 m, 16.–19.XI.1999, leg. A. Riedel, 2 ex. SMNS. – NE Halmahera, 5 km E Labi Labi, 2.VI.1997, leg. M. Hiermeier, 5 ex. CRGT. – NW Halmahera, 7 km S Jailolo, 200 m, 27.I.2006, leg. A. Weigel, 2 ex. NME.

Diagnostic characters: Dorsal view see Fig. 11, dorsal side blackish without metallic shine, body length 9.5–11.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc swollen, with dense and partly confluent punctation, before base punctures more separate, between punctures without granules; pronotum before base with shallow transverse impression and medially with shallow longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, interval 1 flat, intervals 2–8 with complete keels. Tibiae externally without distinct keels; anterior male tibiae internally with two narrow longitudinal stripes of densely set light setae. Aedeagus see Fig. 57.

Distribution: Bacan (= Batjan) Island, Banda Island (type locality), Morotai, Halmahera (Moluccan Islands).

Bradymerus sculptilis Kulzer, 1951
(Figs. 13, 58)

Studied type material: Papua New Guinea, Bolan Mts., 1 ♂ paratype NHMB.

Examined material: Papua New Guinea (labelled as D. N. Guinea), Wareo, 12 ex. MNB. – Papua New Guinea, Bolan Mts., no further data, 3 ex. SMNS. – Papua New Guinea, Eastern Highlands Prov., Kainantu, Onerunka, VII.1981, leg. W. G. Ullrich, 1 ex. CKAO. – Papua New Guinea, Madang Distr., Finisterre Mts., 5550 ft., 30.X.–15.XI.1964, collector unknown, 3 ex. BMNH. – Papua New Guinea, Eastern Highlands Prov., Okapa, 5000 ft., 4.–15.II.1965, collector unknown, 1 ex. BMNH. – Papua New Guinea, Eastern Highlands Prov., Okapa, II.2003, collector unknown, 1 ex. CKAO. – Papua New Guinea, Southern Highland Prov., Tari to Koroba, Hake, 1700–2000 m, 14.V.1998, leg. A. Riedel, 2 ex. SMNS. – West Papua, Anggi, Iray, Gunung Disbehey, 1900–2100 m, 19.–20.III.1993, leg. A. Riedel, 2 ex. SMNS. – West Papua, Minyambou, 1500–1900 m, 13.–14.IV.1993, leg. A. Riedel, 5 ex. SMNS. – West Papua, Manokwari Prov., Mokwam, 1300–1600 m, 17.IV.1993, leg. A. Riedel, 1 ex. SMNS. – West Papua, Arfak Mts., Mokwam (Siyoubrig), 1400–1800 m, 24.–28.II.2007, leg. R. Gerstmeier, 1 ex. CRGT. – West Papua, Manokwari Prov., Mokwam (Siyoubrig), 1400–1800 m, 24.–28. II.2007, leg. A. Weigel, 1 ex. NME.

Diagnostic characters: Dorsal view see Fig. 13, dorsal side blackish without metallic shine, body length 8.5–11.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base in the middle with a small impunctate field, between punctures without granules; pronotum medially with longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals convex and with keels, these keels slightly sinuate and sometimes interrupted, particularly on intervals 6, 8, 9. Tibiae externally with distinct keels; male tibiae without modifications, male posterior femora ventrally with a patch of densely set light setae. Aedeagus see Fig. 58.

Distribution: New Guinea (type locality Bolan Mts.).

Bradymerus semiasperatus Fairmaire, 1883
(Figs. 18, 53)

Examined material: New Britain (labelled as Neupommern), 1 ♂ NHMB (det. Gebien). – Papua New Guinea (labelled as D. N. Guinea), Simpsonhafen, V.1909, leg. H. Schoede, 1 ♂ MNB (det. Gebien).

Diagnostic characters: Dorsal view see Fig. 18, dorsal side blackish without metallic shine, head, pronotum and elytra with distinct densely set scales, body length 9.3–9.8 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin without crenulation, pronotal disc swollen, with rough and partly confluent punctation, before base punctures more separate, between punctures with several granules; pronotum before base with shallow transverse impression and medially with distinct longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals distinctly convex and regular with a row of distinct granules. Tibiae externally without distinct keels; anterior male tibiae internally with longitudinal stripe of densely set light setae. Aedeagus see Fig. 53.

Distribution: New Guinea, New Britain (type locality).

Bradymerus solomonis Kaszab, 1980
(Figs. 31, 48)

Studied type material: Solomon Islands, Santa Isabel, Tatan Bay, 22.VIII.1963, leg. P. Greenslade, ♂ holotype HNHM. – Solomon Islands, different data, 15 paratypes HNHM.

Examined material: Vanuatu (labelled as N. Hebrides), SW Efate Island, Porto Vila, 0–200 ft., 2.XII.1922, 1 ex. BMNH. – West Papua, Fakfak, 2 km E airstrip, 16.–18.VII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, 10 km N Fakfak, Rankendag II, 9.VII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, 60 km E Asori, Kwadewa Camp near Wapoga River, 10.I.1999, leg. A. Weigel, 1 ex. CRGT.

Diagnostic characters: Dorsal view see Fig. 31, dorsal side blackish without metallic shine, body length 5.5–6.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with dense and confluent punctation, between punctures with a few distinct granules; pronotum medially with longitudinal impression. Elytra with punctural rows without striae, punctures normally impressed, intervals 1, 3, 5, 7 flat and with complete keels, keels feebly sinuate, intervals 2, 4, 6, 8 flat and with a row of small granules, in external intervals granules confluent and nearly keeled. Tibiae externally without distinct keels; male tibiae without modifications. Aedeagus see Fig. 48.

Remarks: The reexamined type series of *B. solomonis* in HNHM (holotype and 15 paratypes) is somewhat variable in dorsal structure, but all specimens have the genae narrower than eyes, weak supraorbital keels, and convex pronotal disc. See also under *B. beccarii* n. sp. and *B. biroi* n. sp.

Distribution: Solomon and Rennell Islands (type locality Santa Isabel), Vanuatu (former New Hebrides), New Guinea.

Bradymerus ternatensis Kulzer, 1951
(Fig. 26)

Studied type material: Ternate Island, leg. Kannegieter, 1 ♀ holotype ZMAN. – Same data as holotype, 1 ♀ paratype ZMAN.

Examined material: Ternate Island, leg. W. Doherty, 1 ♀ BMNH.

Diagnostic characters: Dorsal view see Fig. 26, dorsal side blackish without metallic shine, body length 7.5–7.8 mm. Genae broader than eyes, frons with distinct supraorbital furrows and with distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with rough and confluent punctation, between punctures with granules; pronotum medially with distinct longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, all intervals distinctly convex and with elongate granules, partly confluent and keeled. Tibiae externally without distinct keels; modifications of male tibiae unknown (only females available). Aedeagus unknown.

Distribution: Ternate (type locality) (Moluccan Islands W Halmahera).

Bradymerus toxopei Kulzer, 1951
(Figs. 25, 47)

Studied type material: Buru, station 5, IV.1921, leg. L. J. Toxopeus, ♂ holotype ZMAN. – Buru, station 9, IV.–IX.1921, leg. L. J. Toxopeus, 9 paratypes (sex not examined) ZMAN. – Buru, station 9, 13.VIII.1921, leg. L. J. Toxopeus, 1 paratype (sex not examined) NHMB.

Examined material: Bacan (labelled as Batjan), leg. W. Doherty, 1 ex. BMNH. – Sangir Island, Taroena, leg. W. Doherty, 1 ex. BMNH. – West Papua, Paniai Prov., Nabire, Pusppensaat, 200–500 m, 14.–15.VIII.1991, leg. A. Riedel, 4 ex. SMNS.

Diagnostic characters: Dorsal view see Fig. 25, dorsal side blackish without metallic shine, body length 7.5–8.5 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc flat, with dense and partly confluent punctation, punctures on disc more separate before base and medially, between punctures without granules; pronotum before base with shallow transverse impression and medially with feeble longitudinal impression. Elytra with punctural rows without striae, punctures

normally impressed, interval 1 convex and without keel, intervals 2–8 convex and with fine but complete keels. Tibiae externally at base with feeble keels; male posterior tibiae feebly clavate and internally with a line of densely set pale setae. Aedeagus see Fig. 47.

Distribution: Buru (type locality), Bacan (Moluccan Islands); Sangir (N of Sulawesi), New Guinea.

Bradymerus trobriandensis Gebien, 1922

Diagnostic characters: This species was stated by Gebien (1922) to be similar to *B. helleri*, but the genae are broader, the pronotal disc is more convex, and the elytral punctures are without granules. See Gebien (1922: pl. IX, fig. 7).

Remark: Type material was not studied because it is missing in NHMB (Frey collection).

Distribution: Trobriand Island (SE New Guinea) (type locality).

Bradymerus wegneri Kaszab, 1964

Bradymerus kulzeri Schawaller, 2006 **n. syn.**

Studied type material: Amboina, 70 m, 14.VI.1961, leg. A. M. R. Wegner, ♂ holotype of *B. wegneri* HNHM. – C Sulawesi, 20 km SE Tambarana, Camp Mauro, 11.–16.VII.1999, leg. L. Bolm, ♂ holotype of *B. kulzeri* SMNS.

Diagnostic characters: For description and figures see Schawaller (2006) under *B. kulzeri* Schawaller, 2006

Synonymy: During the revision of Oriental *Bradymerus* (Schawaller 2006) taxa from other areas were not considered. After reexamination of the holotype of *B. wegneri* Kaszab, 1964 for the present revision of the Papuan Region, it turned out that *B. kulzeri* Schawaller, 2006 from Sulawesi is a junior synonym of *B. wegneri* Kaszab, 1964 – both holotypes show no specific differences.

Distribution: Amboina Island near Seram (type locality of *B. wegneri*) (Moluccan Islands), Sulawesi (type locality of *B. kulzeri*).

3 Descriptions of new Papuan and Moluccan species of *Bradymerus*

Bradymerus albertisi **n. sp.**
(Figs. 32, 35)

Holotype (♂): Moluccan Islands, Seram, Solea, 12 km SE Wahai, 17.I.–6.II.1997, leg. S. Bílý, SMNS.

Paratypes: Same data as holotype, 4 ex. SMNS, 2 ex. NMP, 1 ex. NHMB. – Moluccan Islands, Seram, Air Basar, 6 km E Wahei, 5.XI.1998, leg. S. Bílý, 1 ex. NMP. – Moluccan Islands, Seram, 35 km E Pasahari, 24.–30.X.1998, leg. O. Mehl, 1 ex. HNHM. – Moluccan Islands, Sula Archipelago, Mangole Island, VII.–XII.1977, leg. V. & G. Wegener, 1 ex. NHMB.

Etymology: Named in honour of Luigi Maria d'Albertis (1841–1901), Genoa, an Italian naturalist and explorer, who steamed in 1876 some 940 kilometers up the Fly River in Papua New Guinea, collecting natural history specimens, preserved in the Natural History Museum in Genoa.

Description: Dorsal view see Fig. 32, dorsal side blackish without metallic shine, body length 3.8–4.8 mm. Genae broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base punctures more separate, between punctures partly with granules; pronotum medially with shallow longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, interval 1 with a few small granules, intervals 2–8 with distinctly elongate granules partly forming keels, keel of interval 3 slightly prominent. Tibiae externally each with 3 keels; male tibiae without modifications. Aedeagus see Fig. 35.

Diagnosis: *B. albertisi* n. sp. belongs to the small group of species with small body size and with tibiae externally with three keels (*B. cheesmanae* n. sp., *B. lobicollis* Gebien, 1922, *B. meyeri* n. sp.). However, in *B. cheesmanae* n. sp. (Fig. 15) the surface of the pronotum is quite uneven with three distinct humps, in *B. meyeri* n. sp. (Fig. 34) the pronotal disc is also but differently uneven, and in *B. lobicollis* (Fig. 29) the pronotum is even as in *B. albertisi* n. sp., but is distinctly longer and has extremely protruding anterior corners. The elytral dorsal structure in these species is not identical but similar to a certain extent by flatter internal intervals and keeled external intervals. See also under *B. cheesmanae* n. sp. and *B. meyeri* n. sp.

Bradymerus archboldi **n. sp.**
(Figs. 27, 36)

Holotype (♂): Neu Guinea, Morobe Prov., Sattelberg, no further data, HNHM.

Paratype: Same data as holotype, 1 ex. SMNS.

Etymology: Named in honour of Richard Archbold (1907–1976), US-American sponsor of three biological expeditions to New Guinea 1933–1939 (with the zoologist Austin L. Rand).

Description: Dorsal view see Fig. 27, dorsal side blackish without metallic shine, body length 5.8–6.0 mm. Genae not broader than eyes, frons with distinct supraor-

bital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with crenulation, pronotal disc distinctly convex, with dense and confluent punctation, between punctures with a few feeble granules; pronotum before base with shallow transverse impression and medially with shallow longitudinal impression. Elytra with punctural rows without striae, punctures normally impressed, intervals 1, 3, 5, 7 flat and with complete keels, keels feebly sinuate, intervals 2, 4, 6 flat and without granules. Tibiae externally without distinct keels; male tibiae without modifications. Aedeagus see Fig. 36.

Diagnosis: *B. archboldi* and *B. solomonis* Kaszab, 1980 (Fig. 31) share the small body size and the dorsal elytral pattern with the intervals 1, 3, 5, 7 with complete keels, but in *B. solomonis* the pronotum is distinctly flatter, has a distinct medial impression, and the aedeagi are different (compare Figs. 36, 48). See also under *B. lorentzi* n. sp. (also with distinct convex pronotum).

Bradymerus beccarii **n. sp.**
(Figs. 30, 37)

Holotype (♂): West Papua, Meydoudga, 1200–1400 m, 5.IV.1993, leg. A. Riedel, SMNS.

Paratypes: West Papua, Wandammen Bay, Wondiwoi Mts., Wasior, 250–600 m, 4.I.2001, leg. A. Riedel, 1 ♀ SMNS. – West Papua, Nabire, 54 km S Ilaga Road, Pusppenssat, IX.1991, leg. P. Hoyois, 2 ex. CRGT.

Etymology: Named in honour of Odoardo Beccari (1843–1920), Italian botanist and traveller, who visited besides Borneo and Sulawesi also New Guinea 1871–1876 (partly together with Luigi Maria d'Albertis), and collected not only plants but also zoological specimens.

Description: Dorsal view see Fig. 30, dorsal side blackish without metallic shine, body length 4.7–5.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, between punctures with a few higher granules; pronotum medially with impression. Elytra with punctural rows without striae, punctures deeply impressed, interval 1 flat and with a few very tiny granules, intervals 2, 4, 6 flat and without granules, intervals 3, 5, 7, 8 convex and with complete keels, keels feebly sinuate. Tibiae externally at base with feeble keels; male tibiae without modifications. Aedeagus see Fig. 37.

Diagnosis: *B. beccarii* is similar to *B. solomonis* Kaszab, 1980 by the small body size and the dorsal structure of pronotum and elytra (Fig. 31), but in the latter species the elytral punctural rows are smaller with the third row with about 33 punctures (about 25 punctures in *beccarii* n. sp.), the flat elytral intervals 2, 4, 6 bear tiny granules (without any granules in *beccarii* n. sp.), and the aedeagus is different with longer basale and straight triangular apicale (compare Figs. 37, 48). *B. biroi* n. sp. (Figs. 33, 38) belongs to the same group of small species, but has the genae distinctly broader than the eyes and the distinct supraorbital keels, and the aedeagus is different.

Bradymerus biroi **n. sp.**
(Figs. 33, 38)

Holotype (♂): West Papua, Jayapura, Sentani, Cyclops Mts., 300–500 m, 31.X.1992, leg. A. Riedel, SMNS.

Paratypes: Same data as holotype, 9 ex. SMNS. – West Papua, Jayawijaya Prov., Borme, 1000–1300 m, 13.–18. VIII.1992, leg. A. Riedel, 1 ex. SMNS. – Papua New Guinea, Morobe Prov., Lae, 4.–6.IX.1968, leg. J. Balogh, 2 ex. HNHM. – New Britain (labelled as Neupommern), Mope, 7.XI.1936, leg. P. J. Schneider, 2 ex. HNHM.

Etymology: Named in honour of Lajos Biró (1856–1931), Budapest, who from 1896 to 1902 collected mainly zoological material in New Guinea (mainly around the Astrolabe Bay) for the Hungarian National Museum (now Hungarian Natural History Museum), but valuable ethnographic objects and botanical specimens as well.

Description: Dorsal view see Fig. 33, dorsal side blackish without metallic shine, body length 4.0–5.2 mm. Genae broader than eyes, frons with distinct supraorbital furrows and with distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with dense and confluent punctation, between punctures with some distinct granules; pronotum medially with impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals 2, 4, 6 flat and at most with a few tiny granules, intervals 1, 3, 5, 7, 8 convex and with complete keels, keels feebly sinuate. Tibiae externally without distinct keels; male tibiae without modifications. Aedeagus see Fig. 38.

Diagnosis: *Bradymerus biroi* n. sp. is very similar to *B. solomonis* Kaszab, 1980 concerning small body size, elytral dorsal structure and even aedeagus, but differs by genae broader than eyes, by higher supraorbital keels and mainly by distinctly flatter pronotum (compare Figs. 31, 33). See also under *B. beccarii* n. sp. (Figs. 30, 37).

Remarks: The reexamined type series of *B. solomonis* in HNHM is large (holotype and 15 paratypes) and somewhat variable in dorsal structure, but all specimens have the genae narrower than eyes, weak supraorbital keels, and convex pronotal disc. As long as intermediate specimens are unknown, the above mentioned specimens from New Guinea and New Britain are considered to represent a different species.

Bradymerus buergersi **n. sp.**
(Figs. 2, 49)

Holotype (♂): West Papua, Wandammen Bay, Wondiwoi Mts., Wasior, 300–850 m, 5.I.2001, leg. A. Riedel, SMNS.

Paratypes: West Papua, Fakfak, 2 km E airstrip, 16.–18. VII.1996, leg. P. Schüle & P. Stüben, 1 ex. SMNS. – West Papua, Jayawijaya Prov., Borma, 1000–1300 m, 12.–18.VIII.1992, leg. A. Riedel, 1 ex. SMNS. – West Papua, Jayawijaya Prov., Endoman, 900–1200 m, 29.IX.1993, leg. A. Riedel, 2 ex. SMNS. – West Papua, 130 km SE Kaimana, Omba (= Yamor) River, 1020 m, 9.–11.II.2011, leg. A. Weigel, 4 ex. NME. – Papua New Guinea, Lae, XII.1977, leg. J. Sedlacek, 6 ex. HNHM.

Etymology: Named in honour of Joseph Bürgers (1881–1954), physician of the German "Kaiserin Augusta Fluß Expedition" 1912–1913 to New Guinea, collecting zoological specimens for the Berlin Museum of Natural History.

Description: Dorsal view see Fig. 2, dorsal side blackish without metallic shine, body length 9.0–12.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows and with feeble supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base in the middle with a large impunctate field, with distinct lateral impressions, between punctures with high granules; pronotum medially with longitudinal impression. Elytra with punctural rows without striae, punctures deeply impressed, interval 1 flat and with a row of distinct granules, these sometimes confluent at base and confluently keeled in posterior third, intervals 2, 4 flat and without granules, interval 6 flat and posteriorly with a row of granules, intervals 3, 5, 7 with distinct complete keels. Tibiae externally with indistinct keels; male tibiae without modifications. Aedeagus see Fig. 49.

Diagnosis: *B. buergersi* n. sp. belongs to the species group around the common *B. principatus*, and shares with this species the large body size, the 6-segmented antennal club, the genae not broader than eyes and the shape and rough dorsal punctation of the pronotum, but can easily be distinguished by the different aedeagus, by the larger impunctate field at the pronotal base and by the elytral structure with flat intervals 2, 4 without any granules and with intervals 3, 5, 7 with distinct and high keels (compare Figs. 2, 10). *B. macrogonus* (Figs. 6, 51) has the genae broader than eyes, a different elytral structure, and a different aedeagus. See also under *B. neuhaussi* n. sp. (Figs. 7, 52).

Bradymerus cheesmanae **n. sp.**
(Figs. 15, 39)

Holotype (♂): West Papua, Japen Island, north coast, Tindaret, 100 m, 21.XII.2000, leg. A. Riedel, SMNS.

Paratypes: West Papua, Jayapura, Sentani, Cyclops Mts., 400–800 m, 7.VIII.1992, leg. A. Riedel, 1 ex. SMNS. – West Papua, Jayapura, Sentani, Cyclops Mts., 950–1450 m, 3.X.1992, leg. A. Riedel, 1 ex. SMNS. – West Papua, Jayawijaya Prov., Borme, 1000–1450 m, 12.–18.VIII.1992, leg. A. Riedel, 2 ex. SMNS. – West Papua, 50 km S Nabire, Pusppenssat, 730 m, 20.II.1998, leg. A. Weigel, 1 ex. CAWW. – West Papua, 50 km S Nabire, Flaga Road, Pusppenssat, 18.II.1998, leg. A. Weigel, 1 ex. CRGT. – West Papua, Sorong, Dusun Meibo, 100–150 m, 19.I.2001, leg. A. Riedel, 2 ex. SMNS. – West Papua, 18 km NE Kaimana, 50–80 m, 21.–25.II.2011, leg. A. Weigel, 2 ex. NME, 1 ex. CRGT. – West Papua, road 10 km NE Kaimana, 40 m, 1.II.2011, leg. A. Skale, 2 ex. CASH. – West Papua, 50 km SE Kaimana, Triton Bay, Kamaka, 10–50 m, 2.–5.II.2011, leg. A. Skale, 1 ex. NME. – West Papua (labelled as Dutch New Guinea), Waigeo, Mt. Nok, camp 2 (Buffelhorn), VI.1938, leg. L. E. Cheesman, 1 ex. BMNH. – Papua New Guinea, Morobe Prov., Bulolo, 900 m, 13.II.–13.III.1979, leg. J. Sedlacek, 1 ex. HNHM. – Moluccan Islands, Morotai, W Daruba, Raja, 50–100 m, 18.XI.1999, leg. A. Riedel, 1 ex. SMNS.

Etymology: Named in honour of Lucy Evelyn Cheesman (1881–1969), British entomologist and traveller, assisting as volunteer at the Natural History Museum, London, and collecting various insects on expeditions to the Marquesas and Galapagos Islands, as well as to New Guinea, the New Hebrides (now Vanuatu) and other Pacific Islands.

Description: Dorsal view see Fig. 15, dorsal side blackish without metallic shine, body length 5.2–7.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base punctures more separate, between punctures partly with high granules, so that the pronotal disc bears 1 hump behind the middle and 1 hump on each side; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals 1, 2 with distinct elongate granules, intervals 3–8 with distinctly elongate granules partly forming keels. Tibiae externally with 3 keels; male tibiae without modifications. Aedeagus see Fig. 39.

Diagnosis: *B. cheesmanae* n. sp. is similar and related to *B. lobicollis* Gebien, 1922 (Fig. 29), both species share small body size, antenna with 6 antennomeres forming a club, elytral structure (compare (Figs. 15 and 29) and particularly the tibiae externally with three keels, an unusual character within the genus. Both species can be separated by the form of the pronotum (lateral margin with distinct crenulation and anterior corners shorter acute in *B. cheesmanae* n. sp., nearly smooth and anterior corners longer rounded in *B. lobicollis*), by the dorsal structure of the pronotum (with three high humps in *B. cheesmanae* n. sp., with three longitudinal impressions in *B. lobicollis*), and by the elytral structure (lateral margin with serriform tubercles in *B. cheesmanae* n. sp., nearly smooth in *B. lobicollis*). The aedeagus of *B. lobicollis* is unknown (only female available). See also under *B. albertisi* n. sp. and *B. meyeri* n. sp.

Bradymerus dahli **n. sp.**
(Fig. 3)

Holotype (♀): Papua New Guinea, Etappenberg, 19.IX.–8.X.1912, leg. S. Ledermann, MNB.

Paratype: West Papua, Jayapura, Sentani, Cyclops Mts., 500–1100 m, 28.XII.2007, leg. A. Riedel, 1 ♀ SMNS.

Etymology: Named in honour of Karl Friedrich Theodor Dahl (1856–1929), curator of the Zoological Museum in Berlin, and collector of Coleoptera during his zoological expedition 1896–1897 to New Britain and Papua New Guinea.

Description: Dorsal view see Fig. 3, dorsal side blackish without metallic shine, body length 12.0–12.3 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin nearly smooth without crenulation, pronotal disc flat, with fine and separate punctation, between punctures with a few granules; pronotum somewhat uneven and before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals distinctly convex and regular with a row of high granules. Tibiae externally without distinct keels; modifications of male tibiae unknown (only females available). Aedeagus unknown.

Diagnosis: *B. dahli* n. sp. is similar to *B. helleri* Gebien, 1922 concerning large body size, shape of antennomeres and dorsal structure of elytra, but differs by the shape of the pronotum with longer protruding anterior corners, by flatter pronotal disc, and by distinctly larger and higher elytral granules (compare Figs. 3 and 5).

Remarks: This large species is easy to recognize and this justifies its description on the basis of females. The similar and certainly related species *B. helleri* is also known only from two females, thus the aedeagi cannot be compared.

Bradymerus dohertyi **n. sp.**
(Figs. 24, 41)

Holotype (♂): West Papua, Fakfak, Mambuni to Buni, 11.VII.1996, leg. P. Schüle & P. Stüben, SMNS.

Paratypes: Papua New Guinea, Karimui, 1000 m, II.1974, leg. J. Sedlacek, 1 ex. HNHM. – West Papua, Raja Ampat Prov., Salawati Island, Kalobo, 24.–28.I.2004, leg. A. Skale, 1 ex. CRGT.

Etymology: Named in honour of William Doherty (1857–1901), American lepidopterologist, who collected not only butterflies in southeastern Asia including New Guinea and eastern Africa, but also many other insects, and even birds (for Walter Rothschild).

Description: Dorsal view see Fig. 24, dorsal side blackish without metallic shine, body length 7.3–9.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation, pronotal disc convex, with dense but not confluent punctation, before base punctures more separate, between punctures with a few granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, intervals 1–4 flat and with a row of small and separate tubercles, intervals 5–8 with longitudinal confluent, almost keeled tubercles. Tibiae externally without distinct keels; male tibiae without modifications. Aedeagus see Fig. 41.

Diagnosis: *B. dohertyi* n. sp. belongs to the group of species consisting of *B. doleschalli* (Fig. 4), *B. nigerrimus* (Fig. 9) and *B. rugipleuris* (Fig. 11) and can be recognized by the shining black surface, by the convex pronotum without any impressions, and by the elytra with the intervals 1–4 flat and with small and separate tubercles and with the intervals 5–8 with confluent, nearly keeled tubercles. In the other species, only the intervals 1 or 1–2 bear tubercles and the intervals 3–8 bear keels. Additionally, *B. rugipleuris* has the pronotum medially with a longitudinal impression.

Bradymerus lorentzi **n. sp.**
(Fig. 28)

Holotype (♀): Moluccan Islands, Seram, 35 km E Pasahari, Unit O, 24.–30.X.1998, leg. O. Mehl, HNHM.

Etymology: Named in honour of Hendrikus Albertus Lorentz (1871–1944), Dutch jurist and biologist, leader of two Netherland expeditions to New Guinea 1907–1910.

Description: Dorsal view see Fig. 28, dorsal side blackish without metallic shine, body length 5.7 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 5 antennomeres forming a club. Anterior corners of pronotum protruding, lateral margin with crenulation, pronotal disc distinctly convex, with rough and confluent punctation, before base punctures more separate, between punctures without granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, interval 1 feebly convex and with a row of few and tiny granules, intervals 2–8 with complete, slightly sinuate keels. Tibiae externally with distinct keels; modifications of male tibiae unknown (only female available). Aedeagus unknown.

Diagnosis: *B. lorentzi* n. sp. can be recognized by the small body size, the distinctly convex pronotum with rough confluent punctation but without medially longitudinal impression, the pronotum with long acute anterior corners, the elytra with similarly keeled intervals 2–8, and the tibiae with distinct external keel. No similar species is known in the studied area. *B. archboldi* n. sp. has also a

small body size and a distinctly convex pronotum, but in this species the elytral dorsal pattern is different: only the intervals 1, 3, 5, and 7 have complete keels.

Bradymerus meyeri **n. sp.**
(Fig. 34)

Holotype (♀): West Papua, Asori, 60 km E Kwadewa, Camp near Wapoga River, 10.I.1999, leg. A. Weigel, NME.

Paratypes: Papua New Guinea, New Britain, 30 km SW Kokopo, Arabam, 200 m, 21.II.–4.III.2000, leg. A. Weigel, 1 ♀ CRGT, 1 ♀ SMNS.

Etymology: Named in honour of Adolf Bernhard Meyer (1840–1911), German zoologist and anthropologist, and director (1874–1906) of the Natural History Museum in Dresden. Meyer travelled in 1870 to Sulawesi and the Philippines, and in 1872 to New Guinea, where he collected ethnographic objects as well as zoological specimens.

Description: Dorsal view see Fig. 34, dorsal side blackish without metallic shine, body length 4.0 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum protruding, lateral margin with distinct crenulation, pronotal disc convex, with rough and confluent punctation, before base punctures more separate, between punctures partly with high granules, so that the pronotal disc bears a separate flat groove surrounded by high granules; pronotum before base with shallow transverse impression. Elytra with punctural rows without striae, punctures deeply impressed, interval 1 with a few small elongate granules, intervals 2–8 with distinctly elongate granules partly forming keels. Tibiae externally with 3 keels; modifications of male tibiae unknown (only females available). Aedeagus unknown.

Diagnosis: *B. meyeri* n. sp. is a member of the *B. lobicollis* species group with small body size and with tibiae externally with three keels, but differs in dorsal shape and structure from the other New Guinean species of this group and is more similar and probably related to *B. sprecherae*, described from Sulawesi (Schawaller 2006: figs. 69, 134). In the latter species, the pronotal granules are more numerous, distinctly smaller and arranged in a different way, the pronotal anterior corners are acute (rounded in *B. meyeri* n. sp.), and the elytral granules are smaller and lower as in *B. meyeri* n. sp.

Bradymerus neuhaussi **n. sp.**
(Figs. 7, 52)

Holotype (♂): West Papua, Manokwari Prov., Minyambou to Mokwam, Arfak Mts., 1300–1900 m, 16.IV.1993, leg. A. Riedel, SMNS.

Paratypes: West Papua, Anggi, Tetaho, Iranmeba, 1500–1700 m, 25.III.1993, leg. A. Riedel, 4 ex. SMNS, 1 ex. HNHM.

Etymology: Named in honour of Richard Neuhauss (1855–1915), German physician and photographer, joined in an expedition 1908–1910 to New Guinea together with the botanist Richard Schlechter and the anthropologist Otto Schlaginhaufen.

Description: Dorsal view see Fig. 7, dorsal side blackish without metallic shine, body length 11.0–11.8 mm. Genae not broader than eyes, frons with distinct supraorbital furrows but without distinct supraorbital keels. Last 6 antennomeres forming a club. Anterior corners of pronotum distinctly protruding, lateral margin with feeble crenulation and unusually bent upwards, pronotal disc feebly convex, with rough and partly confluent punctation, before base in the middle with a large impunctate field with distinct lateral impressions, between punctures with high granules; pronotum medially with longitudinal impression bordered distally by a pair of short keels. Elytra with punctural rows without striae, punctures deeply impressed, intervals 1, 3, 5, 7 flat and with complete keels, intervals 2, 4 flat and without any granules, interval 6 flat and posteriorly with a row of granules. Tibiae externally without distinct keels; male posterior tibiae internally with a fine longitudinal stripe of densely set light setae. Aedeagus see Fig. 52.

Diagnosis: *B. neuhaussi* n. sp. belongs to the species group around the common *B. principatus*, and shares with this species the large body size, the 6-segmented antennal club, the genae not broader than eyes and the shape and rough dorsal punctation of the pronotum, but can be easily distinguished from *B. principatus* by the different aedeagus, the larger impunctate field at the pronotal base, the pronotal lateral margin unusually bent upwards, and the elytral structure with intervals 1, 3, 5, 7 with complete keels (compare Figs. 7 and 10). *B. macrogonus* (Figs. 6, 51) has the genae broader than the eyes, a different elytral structure and a different aedeagus. See also under *B. buergersi* n. sp. (Figs. 2, 49).

4 Key to the Papuan and Moluccan species of *Bradymerus*

The key is suitable only for males because of the use of male sexual characters. Not included in this key are *B. batjanensis* Gebien, 1925 and *B. trobriandensis* Gebien, 1922, because no specimens were available to the author. Included in this key are *B. celebensis* Gebien, 1925 and *B. wegneri* Kaszab, 1964 (syn. *B. kulzeri* Schawaller, 2006), keyed also for the Oriental Region (Schawaller 2006).

1 Larger species, body length 9.0–13.5 mm. **2**
– Smaller species, body length 3.8–8.5 mm. **15**
2 Pronotum conical, widest at base; elytral intervals convex but without keels or granules. – Fig. 12. ..... ***novaeguineense***
– Pronotum with rounded lateral margins, widest in the middle; elytral intervals with keels or granules in different combinations. **3**

3 Elytral intervals with distinct granules, but without keels.... **4**
– At least some, or all elytral intervals with distinct keels. **7**
4 All elytral intervals with densely set high granules (Figs. 3, 5). **5**
– All elytral intervals with small, densely set or separated granules (Figs. 8, 18). **6**
5 Pronotum with protruding anterior corners and flat disc. – Fig. 3. ..... ***dahli* n. sp.**
– Pronotum with rounded anterior corners and convex disc. – Fig. 5. ..... ***helleri***
6 Elytral intervals with a row of small, round and densely set granules, elytra parallel-sided, surface dull. – Figs. 18, 53 ..... ***semiasperatus***
– Elytral intervals with small, longitudinal and separate granules, elytra oval, surface shining. – Figs. 8, 55. ..... ***plicicollis***
7 Pronotum before base in the middle with large, striking and shining, impunctate field (Figs. 2, 7). **8**
– Pronotum before base without or at most with a small impunctate field (e. g. Figs. 6, 10). **9**
8 Pronotum with lateral margins unusually bent upwards, elytral intervals 1, 3, 5, 7 with complete keels. – Figs. 7, 52. ..... ***neuhaussi* n. sp.**
– Pronotum with flat lateral margins, only elytral intervals 3, 5, 7 with complete keels. – Figs. 2, 49. ..... ***buergersi* n. sp.**
9 Genae distinctly broader than eyes. – Figs. 6, 51. ..... ***macrogonus***
– Genae not broader than eyes. **10**
10 Lateral margin of pronotum not separated from convex disc (Figs. 4, 9, 11). **11**
– Lateral margin of pronotum separated from flatter disc (Figs. 10, 13, 14). **13**
11 Pronotal disc swollen, elytral intervals 2–8 with complete keels. – Figs. 11, 57. ..... ***rugipleuris***
– Pronotal disc flatter, elytral intervals 1–2 convex and with a row of feeble granules, only intervals 3–8 with complete keels. **12**
12 Pronotal disc between rough and confluent punctures with granules, apicale of aedeagus with rounded lateral margins. – Figs. 4, 50. ..... ***doleschalli***
– Pronotal disc between rough and confluent punctures without granules, apicale of aedeagus with straight lateral margins. – Figs. 9, 54. ..... ***nigerrimus***
13 Last 4 antennomeres forming a club; elytral intervals 1–4, 6, 8 with a row of small granules, intervals 5, 7 keeled; tibiae externally without distinct keels. – Fig. 14. ..... ***crassimargo***
– Last 6 antennomeres forming a club; elytral intervals different; tibiae externally with distinct keels. **14**
14 Elytral intervals with a row of distinct elongate granules, in intervals 3, 5, 7, 8 these granules higher and more confluent, nearly keeled; basale of aedeagus short. – Figs. 10, 56. ..... ***principatus***
– Elytral intervals with keels, these keels slightly sinuated and sometimes interrupted, particularly on intervals 6, 8, 9; male posterior femora ventrally with a field of densely set light setae; basale of aedeagus longer. – Figs. 13, 58. ..... ***sculptilis***
15 Elytral intervals convex, without keels and granules; male anterior tibiae with distinct internal tooth before the middle. – Figs. 21, 44. ..... ***papuanus***
– Elytral intervals with keels or granules in different combinations; male anterior tibiae without armature. **16**
16 All tibiae in both sexes externally with 3 keels. **17**
– All tibiae in both sexes without or at most with 1 keel..... **20**
17 Pronotum with nearly parallel lateral margins and long protruding anterior corners, pronotal disc with medial and distinct lateral longitudinal impressions (Fig. 29). ..... ***lobicollis***
– Pronotum with rounded lateral margins and shortly protruding anterior corners, pronotal disc without distinct lateral longitudinal impressions (Figs. 15, 32, 34). **18**
18 Pronotal disc with rough and confluent punctation, between punctures partly with granules but without distinct humps or tubercles, disc only with shallow longitudinal impression. – Figs. 32, 35. ..... ***albertisi* n. sp.**
– Pronotal disc different (Figs. 15, 34). **19**
19 Pronotal disc between punctures partly with high granules, so that pronotal disc bears 1 hump behind middle and 1 hump on each side; elytral lateral margin with serriform tubercles. – Figs. 15, 39. ..... ***cheesmanae* n. sp.**
– Pronotal disc between punctures partly with high granules, so that pronotal disc bears a separate flat groove surrounded by high granules; elytral lateral margin only feebly crenulate. – Fig. 34. ..... ***meyeri* n. sp.**
20 Genae distinctly broader than eyes. **21**
– Genae not broader than eyes. **26**
21 Small species, body length 4.0–5.2 mm; pronotum widest in anterior third. – Figs. 33, 38. ..... ***biroi* n. sp.**
– Larger species, body length 6.0–8.0 mm; pronotum widest in the middle or near base. **22**
22 All or odd-numbered elytral intervals with complete keels... **23**
– Elytral intervals with rows of tubercles, sometimes tubercles confluent and partly keeled. **24**
23 All elytral intervals with complete high keels; frons with distinct supraorbital keels. – Figs. 16, 40. ..... ***crenatus***
– Elytral intervals 1 (only posteriorly), 3, 5, and 7 with complete keels; frons without distinct supraorbital keels. – Schawaller 2006: figs. 20, 86. ..... ***celebensis***
24 All elytral intervals with elongate granules, partly confluent and keeled; pronotum widest near the middle. – Fig. 26. ..... ***ternatensis***
– Elytral intervals different (Figs. 22, 23); pronotum widest near base. **25**
25 All elytral intervals with a row of separate distinct granules; pronotum before base in the middle with a small impunctate field; apicale of aedeagus shorter with nearly acute tip. – Figs. 22, 45. ..... ***raucipennis***
– Elytral intervals 1, 3, 5, 7 and 9 with a row of distinct elongate granules, posteriorly tubercles confluent and keeled; pronotum with a large impunctate field before base in the middle; apicale of aedeagus longer with rounded tip. – Figs. 23, 46... ..... ***regularis***
26 All elytral intervals flat and densely wrinkled, pronotal disc between confluent punctures with several granules, anterior corners of pronotum not protruding. – Schawaller 2006: figs. 46, 112 under *kulzeri*. ..... ***wegneri***
– Elytral intervals at least partly with keels or granules; pronotal disc between punctures sometimes only with a few granules, anterior corners of pronotum protruding. **27**
27 Pronotum with finer separate punctation, at least widely before base (e. g. Figs. 19, 24). **28**
– Pronotum with rough confluent punctation, at most only small field before scutellum with separate punctation (e. g. Figs. 20, 27). **31**
28 Elytral intervals 2–8 with fine or distinct complete keels. . **29**

– Elytral intervals at least partly with rows of separate or confluent granules. **30**

29 All elytral intervals with a row of distinct granules. – Fig. 19. ..... ***kuntzeni***

– Elytral intervals 1–4 flat and with a row of small and separate tubercles, intervals 5–8 with elongate confluent tubercles, nearly keeled. – Figs. 24, 41. ..... ***dohertyi* n. sp.**

30 Larger species, body length 7.5–8.5 mm; last 6 antennomeres forming a club; pronotum flat without transverse basal impression; elytra parallel-sided. – Figs. 25, 47. ..... ***toxopei***

– Smaller species, body length 5.7 mm; last 5 antennomeres forming a club; pronotum convex with shallow transverse basal impression; elytra elongate oval. – Fig. 28..... ..... ***lorentzi* n. sp.**

31 Larger species, body length 6.0–8.5 mm; all elytral intervals with complete keels. **32**

– Smaller species, body length 4.7–6.0 mm; only odd-numbered elytral intervals with complete keels. **33**

32 Body length 6.0–6.5 mm; male posterior femora without setation; aedeagus with basale shorter than apicale. – Figs. 20, 42. ..... ***integer***

– Body length 7.0–8.5 mm; male posterior femora ventrally with small patch of densely set light setae; aedeagus with basale longer than apicale. – Figs. 17, 43. ..... ***laticollis***

33 Body length 4.7–5.0 mm; elytral interval 1 with a few tiny granules, intervals 2, 4, and 6 without granules, intervals 3, 5, 7, and 8 with complete keels. – Figs. 30, 37.....***beccarii* n. sp.**

– Body length 5.5–6.0 mm; elytral intervals 1, 3, 5, and 7 with complete keels (Figs. 27, 31). **34**

34 Pronotum flat with distinct medial impression; aedeagus with basale longer than apicale, apicale elongate triangular. – Figs. 31, 48.....***solomonis***

– Pronotum convex with shallow medial impression; aedeagus with basale equal in length to apicale, apicale broader with rounded sides. – Figs. 27, 36.....***archboldi* n. sp.**

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New and little known species of Tenebrionidae (Coleoptera) from Borneo (3)

Roland Grimm

Abstract

The following new species are described: *Camptobrachys andoi* **n. sp.** (E Malaysia/Sarawak), *Derispia ulfbremeri* **n. sp.** (E Malaysia/Sabah, Indonesia/Sumatra), *Falsonannocerus emasicus* **n. sp.** (E Malaysia/Sabah), *Promethis merkli* **n. sp.** (E Malaysia/Sarawak), and *Uloma (Uloma) gadingica* **n. sp.** (E Malaysia/Sarawak). New synonym: *Toxicum heros* Frivaldszky, 1882 = *T. moultoni* Gebien, 1914 **n. syn.** A lectotype is designated for *T. heros*. New records of *Tetragonomenes borneensis* (Kaszab, 1977) and *Toxicum heros* Frivaldszky, 1882 are given.

Keywords: Tenebrionidae, Borneo, Malaysia, Sabah, Sarawak, Sumatra, Cnodalonini, Ulomini, Stenochiini, new species, new records, synonymy.

Zusammenfassung

Die folgenden neuen Arten werden beschrieben: *Camptobrachys andoi* **n. sp.** (E Malaysia/Sarawak), *Derispia ulfbremeri* **n. sp.** (E Malaysia/Sabah, Indonesien/Sumatra), *Falsonannocerus emasicus* **n. sp.** (E Malaysia/Sabah), *Promethis merkli* **n. sp.** (E Malaysia/Sarawak) und *Uloma (Uloma) gadingica* **n. sp.** (E Malaysia/Sarawak). Neues Synonym: *Toxicum heros* Frivaldszky, 1882 = *T. moultoni* Gebien, 1914 **n. syn.** Für *T. heros* wird ein Lectotypus festgelegt. Neue Funde von *Tetragonomenes borneensis* (Kaszab, 1977) und *Toxicum heros* Frivaldszky, 1882 werden mitgeteilt.

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1 Introduction

Like the first (Grimm 2010) and the second part (Grimm 2011) of this series on Tenebrionidae from Borneo, the present third part treats mainly material from the author's fieldwork in northern Borneo (Sabah, Sarawak), complemented by material from other collections (see acronyms of depositories).

Acknowledgements

For their great help I am grateful to Dr. Ottó Merkl (Budapest) who supported me with a copy of the paper of Frivaldszky (1882) and additional information on *Toxicum heros* Frivaldszky, and to Dr. Kimio Masumoto (Tokyo) who sent on loan the holotype of *Falsonannocerus harukae* Masumoto from the Tokyo National Science Museum and provided photographs of the holotype of *Tetragonomenes borneensis* (Kaszab) for me. For the gift and/or loan of specimens I also thank Dr. Michael Balke (Munich), Prof. (emer.) Dr. Hans J. Bremer (Osnabrück), Dr. Wolfgang Schawaller (Stuttgart), and Dr. Eva Sprecher (Basel). Furthermore, I am grateful to Dr. Ottó Merkl (Budapest) and Dr. Wolfgang Schawaller for reviewing the manuscript. Last but not least I thank Johannes Reibnitz (Stuttgart) again for producing the photographs and arranging the plates.

Acronyms of depositories

CRG	Collection Dr. Roland Grimm, Neuenbürg, Germany
HNHM	Hungarian Natural History Museum, Budapest, Hungary (Dr. Ottó Merkl)
NHMB-F	Naturhistorisches Museum Basel, Collection Frey, Switzerland (Dr. Eva Sprecher)

SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany (Dr. WOLFGANG SCHAWALLER)

ZSMB Collection Prof. Dr. H. J. BREMER in Zoologische Staatssammlung Munich, Germany (Dr. MICHAEL BALKE)

2 The species

2.1 Tenebrioninae Latreille, 1802
Toxicini Lacordaire, 1859

Toxicum heros Frivaldszky, 1882

Toxicum moultoni Gebien, 1914 **n. syn.**

Type material studied

The type series of *Toxicum heros* Frivaldszky, 1882 consists of two male specimens (HNHM), both labelled as syntype. One of them, labelled [Borneo, Sarawak], Matang, leg. XANTUS, 305/792, is designated herewith as lectotype. The other specimen, with same data, but 305/793, is consequently the paralectotype.

The female holotype (labelled as type) of *T. moultoni* Gebien, 1914 (NHMB-F) is labelled Borneo, Kuching, 25.X.[18]99, (MOULTON), Type! No. 297.

Additional material studied

Borneo, Malaysia, Sarawak, Kubah Nat. Park, Headquarter vic., 160–300 m, 15.–17.II.2012, R. GRIMM leg., 1 ♂ (CRG). – Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 50–200 m, 20.–23.II.2012, R. GRIMM leg., 1 ♀ (CRG). – [Indonesia, Kalimantan Barat], Borneo occ., Pontianak, 1900, no collector stated, 1 ♂ (HNHM). – Malaysia, Selangor, Templer Park, lowland rainforest, singled from logs & bracket fungi at night, 5.IV.1995, O. MERKL leg., 5 ♂♂, 6 ♀♀ (HNHM). – Philippines, Mindanao, Surigao, no date and collector stated, 1 ♂ (HNHM). – Philippine Islands, Mindanao, Misamis, 13.IV., no year and collector stated, 1 ♂ (HNHM). – Further material is listed by GRIMM (2010).

Synonymy

As already mentioned by GRIMM (2010), the holotype of *T. moultoni* Gebien is not a male as stated by GEBIEN (1914) but a female. Finding of a male in Sarawak and study of types revealed that GEBIEN's (1914) *T. moultoni* is the female, and thus a synonym, of *T. heros* Frivaldszky (FRIVALDSZKY 1882). As is typical for the genus *Toxicum*, *T. heros* shows a distinct sexual dimorphism: head of female with two glabrous supraorbital horns, head of male with two supraorbital horns fringed with fulvous hairs and two epistomal horns which are joined at base.

Distribution

W Malaysia (new record), E Malaysia/Sarawak; Indonesia/Kalimantan Barat, Philippines/Mindanao (new records).

Ulomini Blanchard, 1845

Uloma (Uloma) gadingica **n. sp.**
(Figs. 1, 6, 11)

Holotype ♂: Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 50–300 m, 20.–23.II.2012, R. GRIMM leg. (CRG).

Paratypes: Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 100–250 m, 9.–12.III.2008, R. GRIMM leg., 1 ♀ (SMNS). – Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 50–200 m, 8.–10.XII.2010, R. GRIMM leg., 1 ♀ (CRG).

Etymology

Named after Gunung Gading where the type series was collected.

Description

Short and stout, oval, convex, apterous; body length 9.2–9.8 mm, body width 4.6–4.8 mm; blackish brown to black, appendages somewhat paler.

Head with clypeus gently sinuate and large impression; in males lateral corners of clypeus and genae tooth-like, and posterior border of impression with raised rim. Punctation coarse and sometimes confluent basally, becoming finer laterally and apically; minute on clypeus. Antennomeres 5–9 in males with somewhat pointed sharp distal border at inner side. Mentum in males without setation, with weak mediobasal excavation and deep laterobasal impressions (Fig. 11).

Pronotum convex, transverse, width/length ratio 1.44–1.58; in males anteriorly with medial impression, which is laterally bordered by tubercle-like elevation. Anterior border finely, lateral borders strongly margined, basal border not margined but with small transverse impression on each side besides the middle. Punctures in anterior-medial impression and corresponding part in females coarse; on vaulted disc fine, scattered, but somewhat stronger on a midlongitudinal stripe; lateral portion with very coarsely punctured stripe, separated from lateral border with nearly smooth area. Scutellum triangular with some minute punctures.

Elytra obovate, convex. Punctures of elytral rows on disc smaller than convex intervals, but nearly as broad as intervals laterally. Lateral border in dorsal view visible only at base. Metaventrite shorter than mesocoxae behind them. Last visible ventrite unbordered.

Legs without modifications.

Aedeagus see Fig. 6.

Differential diagnosis

A review of the species of the genus *Uloma* Dejean, 1821 occuring in Borneo and Sumatra was given by SCHAWALLER (2000). In this paper no apterous *Uloma* is mentioned. Due to its oval, short and stout, strongly convex

body shape the apterous *U. gadingica* n. sp. cannot be confused with any of its congeners so far known from Borneo.

2.2 Diaperinae Latreille, 1802
Leiochrinini Lewis, 1894

Derispia ulfbremeri **n. sp.**
(Figs. 5, 7)

Holotype ♂: Borneo, Malaysia, Sabah, Tawau Hill Park, 21.–22.X.2009, Ulf Bremer leg. (CRG).

Paratypes: Same data as holotype, 1♂, 4♀♀ (CRG), 3 specimens (SMNS), 2 specimens (ZSMB). – [Indonesia], S Sumatra, Lampung prov., Bukit Barisan Selatan Nat. Park, 5°4'S 104°4'E, 5 km SW Liwa, 600 m, 7.–17.II.2000, J. Bezděk leg., 3 specimens (SMNS).

Etymology

Named in honour of Ulf Bremer (Shanghai), one of the collectors of the type series.

Description

Small, round, convex, body length (measured from middle of apex of pronotum to apices of elytra) 2.1–2.2 mm, body width 1.8–1.9 mm. Dorsal side blackish, with 2 large fulvous spots on each elytron; a roundish basal and a transverse subtriangular apical spot; blackish sutural band and transverse bands separating fulvous spots forming a cross. Lateral borders of pronotum and elytra forming a continuous fulvous verge. Legs fulvous, basal antennomeres fulvous to brownish, last 4–6 antennomeres blackish.

Head with minute scattered punctation; clypeus flat; antennomere 3 twice as long as antennomere 2.

Pronotum punctured as head, slightly convex, widest at base; apical border nearly straight, lateral borders arcuate, basal border in front of scutellum protruded posteriorly; apical border, lateral borders and basal border in the middle finely margined. Scutellum triangular, with some fine punctures.

Elytra with fine but distinct, mostly irregularly distributed punctures partially arranged in irregular rows; lateral margins in dorsal view nearly visible throughout the whole length, except apically. Abdominal ventrites with fine scattered punctures.

Legs without modifications.

Aedeagus see Fig. 7.

Differential diagnosis

Derispia batuica Schawaller, 2005 and, according to Kaszab (1946), *D. kuntzeni* Kaszab, 1946 are of the same body size and have also a dorsal colour pattern similar to that of *Derispia ulfbremeri* n. sp. However, *D. batuica* and *D. kuntzeni* have a distinctly different shape of the aedeagus (compare Fig. 7 with Schawaller 2005: figs. 22, 23 and Kaszab 1946: figs. 44, 45), and in both species pronotum and elytra are impunctate. In *D. batuica* the antennae are unicoloured fulvous and not darkened distally.

2.3 Stenochiinae Kirby, 1837
Stenochiini Kirby, 1837

Promethis merkli **n. sp.**
(Figs. 2, 8)

Holotype ♂: Borneo, Malaysia, Sarawak, Kubah Nat. Park, Matang Wildlife Centre vic., 50 m, 11.–12.XII.2010, R. Grimm leg. (CRG).

Paratypes: Same data as holotype, 1♂, 4♀♀ (CRG), 1♀ (SMNS).

Etymology

Named in honour of Dr. Ottó Merkl, curator of Coleoptera in the Hungarian Natural History Museum in Budapest.

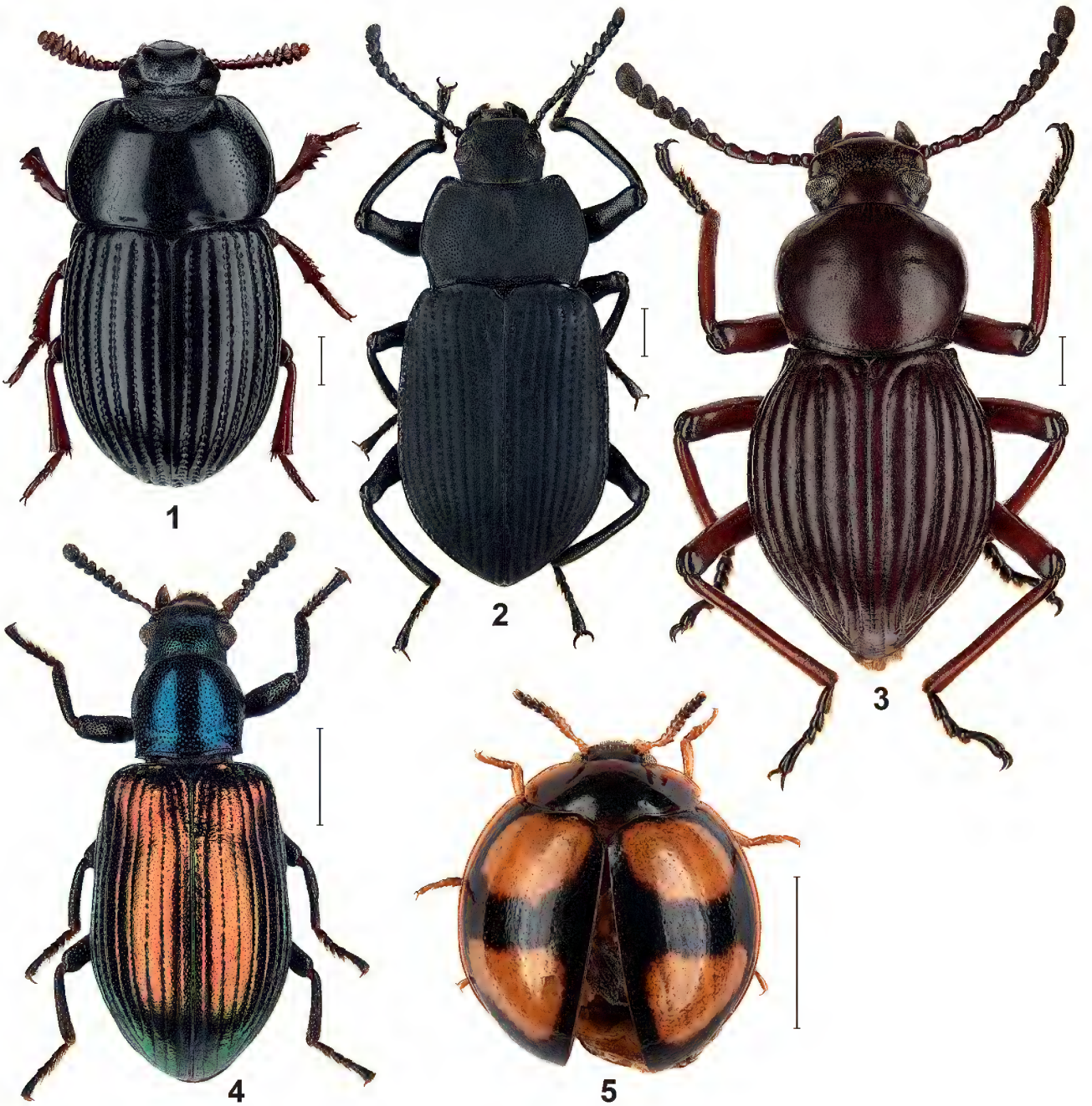
Description

Elongate oval, black, matt. Body length 9.5–10.2 mm, body width 4.2–4.5 mm.

Head with clypeus very slightly emarginate, frontoclypeal suture only feebly indicated; surface with fine, dense, setigerous punctures, setae very small, only visible by higher magnification, punctural interspaces feebly micro-reticulated. Mentum subhexagonal, apically slightly convex transversally, bicoloured with longer, subcordate, piceous, densely and coarsely punctured basal part and a shorter transversal, fulvous, smooth, laterally impressed apical part; anterior border slightly emarginate; punctures bearing fine short or, especially in the middle, long erect hairs.

Pronotum transverse, widest behind middle, width/length ratio (measured transversally along widest part and longitudinally along midline) 1.59–1.65, base slightly wider than apex; anterior border shallowly emarginate, nearly straight in the middle; anterior corners somewhat protruding forward; lateral borders converging toward apex from widest point of pronotum, sinuate before base; basal border slightly bisinuate, lateral borders and basal border distinctly margined, apical border finely margined laterally, margination interrupted in the middle; anterior angles rectangular, rounded, posterior angles subrectangular, pronounced; surface punctured as on head; disc with shallow midlongitudinal impression. Propleura coarsely, setigerous punctured; prosternal process flat, broad, and densely set with coarse, setigerous punctures; slightly raised and smooth along procoxae.

Elytra with scutellar, 1st and 2nd punctures rows distinctly finer than remaining ones. Intervals flat in the middle of disc, becoming slightly convex basally, laterally, and distally; coriaceous, with scattered minute, dust-like setae.



Figs. 1–5. Tenebrionidae spp., dorsal view. – **1**. *Uloma gadingica* n. sp., ♂ holotype (CRG). **2**. *Promethis merkli* n. sp., ♂ holotype (CRG). **3**. *Camptobrachys andoi* n. sp., ♂ holotype (CRG). **4**. *Falsonannocerus emasicus* n. sp., ♂ holotype (CRG). **5**. *Derispia ulfbremeri* n. sp., ♂ holotype (CRG). – Scales: 1 mm.

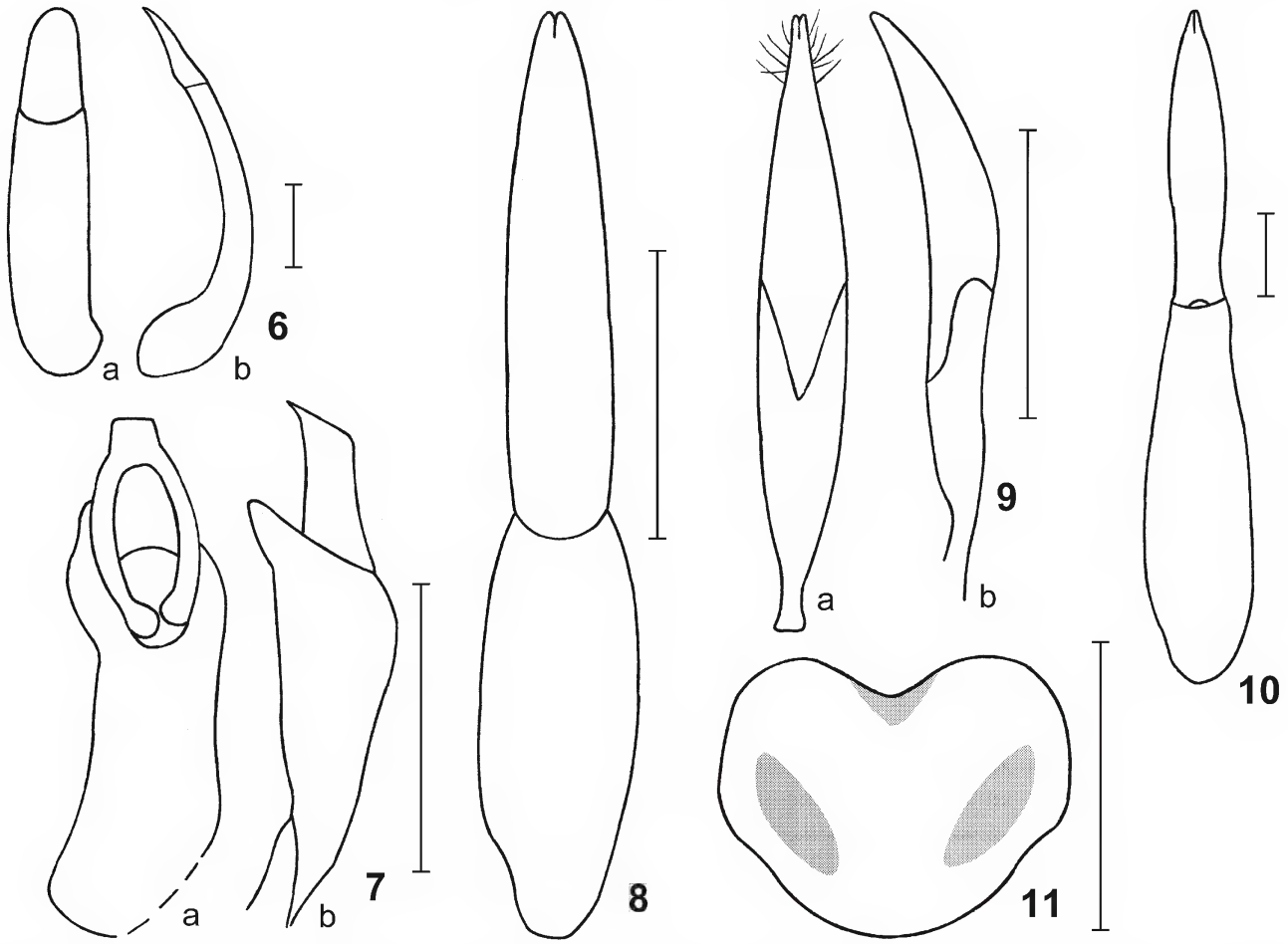
Lateral margin in dorsal view visible over entire length. Metaventrite with setigerous punctures, without any modification; abdominal ventrites with dense, setigerous punctures, last abdominal ventrite apically not margined.

Legs without modifications, only apex of protibiae with short decumbent hairs; protibiae of males a little more bent apically than in females.

Aedeagus see Fig. 8.

Differential diagnosis

Promethis merkli n. sp. is a strikingly small species. The type specimens indicate that this is undoubtedly the smallest species of the genus, taking in consideration the size range of the *Promethis* species in Kaszab (1988). Females may be confused at first glance with small females of *P. aequatorialis* (Blanchard, 1853), but in *P. aequatorialis* the punctation of the pronotum is somewhat sparser



Figs. 6–11. Aedeagi (6–10) and mentum (11) of Tenebrionidae spp. – **6**. *Uloma gadingica* n. sp., dorsal (a) and lateral (b) view. **7**. *Derispia ulfbremeri* n. sp., dorsal (a) and lateral (b) view. **8**. *Promethis merkli* n. sp., dorsal view. **9**. *Falsonannocerus emasicus* n. sp., dorsal (a) and lateral (b) view. **10**. *Camptobrachys andoi* n. sp., dorsal view. **11**. *Uloma gadingica* n. sp., ♂. – Scales: 0.5 mm.

and the elytral intervals are finely but distinctly punctate. The males of *P. aequatorialis* are easy to distinguish by the modified protibiae (see Kaszab 1988: fig. 126 and pl. III-I) and the different aedeagus (compare Fig. 8 with Kaszab 1988: fig. 123).

Camptobrachys andoi **n. sp.**
(Figs. 3, 10)

Holotype ♂: Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 50–200 m, 8.–10.XII.2010, R. Grimm leg. (CRG).

Paratypes: Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 50–300 m, 20.–23.II.2012, R. Grimm leg., 1 ♂, 1 ♀ (CRG). – Borneo, Malaysia, Sarawak, Santubong Peninsula, Permai Rainforest Resort, 30–150 m, 24.–26.II.2012, R. Grimm leg., 1 ♂, 1 ♀ (CRG). – Borneo, Malaysia, Sarawak, Santubong Peninsula, Gunung Santubong, 80–300 m, 24.–26.II.2012, R. Grimm leg., 1 ♀ (CRG). – Borneo, Malaysia, Sarawak, Santubong Peninsula, Permai Rainforest Resort, 10–200 m, 21.III.2008, R. Grimm leg., 1 ♀ (SMNS). – Same data, but 13.–15.III.2008, 1 ♀ (CRG). – Same data, but 23.–27.III.2009, 1 ♀ (CRG). – Same data, but 4.–8.IV.2009, 1 ♀ (CRG). – Borneo, Malaysia, Sarawak, Gunung Gading Nat. Park, 100–300 m, 23.–29.IX.2008, R. Grimm leg., 1 ♀ (CRG), 1 ♀ (SMNS). – Same data, but 31.III.–4.IV.2009, 1 ♀ (CRG).

Etymology

Named in honour of my colleague and friend Dr. Kiyoshi Ando (Osaka, Japan).

Description

Strongly convex, castaneous, legs paler, reddish-brown, antennae distally, apex of femora, tarsi and mouthparts partly black. Body length 11.1–11.7 mm, body width 5.0–5.8 mm.

Head with deep and broad ocular sulcus, weakly notched between clypeus and genae, clypeus flat with anterior border straight, very finely punctured, intermin-

gled with larger punctures in basal half and especially near clypeal sulcus. Frons flat, smooth to very finely punctured on posterior part, coarsely punctured near clypeal sulcus, punctation partly confluent and continuing beyond clypeal sulcus. Vertex almost smooth; genae raised, punctured as clypeus.

Pronotum very finely punctured, convex, subcordate, widest just before middle, width/length ratio (width measured at widest point, length along longitudinal midline) 1.20–1.30. Lateral borders arcuate anteriorly, nearly straight posteriorly; posterior border arcuate, anterior border nearly straight, lateral borders finely and sharply margined, lateral margins visible or sometimes partially not visible in dorsal view; anterior margin interrupted in the middle, posterior border broadly margined; anterior and posterior angles obtuse, anterior angles rounded. Prosternal process bent down between coxae, extending toward rounded apex.

Elytra obovate, sometimes nearly rounded, strongly convex, with lateral intervals bent downwards; deeply striate, striae finely punctate on disc, punctures more distinct in lateral striae; intervals strongly convex, smooth. Length/width ratio 1.13–1.24. Combined base of elytra shallowly sinuate. Lateral margin in dorsal view visible only near base and apex.

Legs long, narrow; tibiae straight, subcylindrical.

Aedeagus see Fig. 10.

Differential diagnosis

Camptobrachys andoi n. sp. is similar to *C. sarawakensis* Grimm, 2011 with which it was confused by Grimm (2011). As newly collected material reveals, the female paratypes of *C. sarawakensis* as designated by Grimm (2011) belong to *C. andoi* n. sp. described here. This means that so far only the male holotype of *C. sarawakensis* is known. *C. sarawakensis* (body length 9.0 mm, body width 4.3 mm) is much smaller than *C. andoi* n. sp., the pronotum is more convex, the colouration of the body is darker blackish (see Grimm 2010: figs. 4 and 5; fig. 5 shows a female of *C. andoi* n. sp.). Both species can be clearly distinguished by the shape of the aedeagus (compare Fig. 10 with Grimm 2010: fig. 13).

Tetragonomenes borneensis (Kaszab, 1977)

Material studied

Borneo, Malaysia, Sabah, Crocker Range, Gunung Alab, 1350 m, 20.XI.2006, R. Grimm leg., 4 specimens (CRG).

Remarks

T. borneensis was described by Kaszab (1977) under *Obriomaia* Gebien, 1927 on the basis of a single male from Mt. Kinabalu (Sabah, N Borneo).

Falsonannocerus emasicus **n. sp.**
(Figs. 4, 9)

Holotype ♂: Borneo, Malaysia, Sabah, Crocker Range, Gunung Emas, 1500 m, 16.–17.III.2007, R. Grimm leg. (CRG).

Paratype: Borneo, Malaysia, Sarawak, Gunong Emas vic., 15.–27.IV.1993, Jeniš & Štrba leg., 1 ♂ (ZSMB).

Etymology

Named after Gunung Emas where the types were collected.

Description

Oblong ovate, strongly convex; dorsal side of head and pronotum dark metallic greenish blue; elytra golden to coppery, laterally and distally greenish blue; ventral side, antennae and legs piceous to black, legs with metallic tinge. Body length 5.0–5.3 mm, body width 2.1–2.2 mm.

Head coarsely and densely punctured, punctures larger than intermediate spaces; anterior border of clypeus slightly and broadly emarginate; fronto-clypeal sulcus distinct, frons slightly inclined anteriorly; genae moderately raised; eyes large, convex; head with supraorbital sulcus coming down to upper part of temple. Antennae with last 7 antennomeres forming a club.

Pronotum subquadrate, width/length ratio 1.09–1.11; strongly convex transversely, moderately convex longitudinally but strongly sloping to flattened basal part; punctation less dense and somewhat finer than on head, interspaces usually larger than diameter of punctures; anterior border slightly and broadly arcuate and not margined; lateral borders arcuate in frontal half, slightly sinuate in basal half, finely margined, the margination in dorsal view not visible; basal border slightly bisinuate, distinctly margined in about medial three-fourths, becoming finer laterally. Anterior angles obtuse, posterior angles subrectanglar. Scutellum subpentagonal, with a few punctures.

Elytra dilated posteriorly, with maximum width at about two-thirds of elytral length; strongly convex, highest in about middle, with shallow inverted V-shaped impression in basal one-fifth; punctate-striate, strial punctures fine, elongate, closely set; intervals slightly convex on disc, becoming more convex laterally, with fine scattered punctures; humeral callosity week.

Legs: Femora and tibiae densely punctured.

Aedeagus see Fig. 9.

Differential diagnosis

With its metallic colouration *F. emasicus* n. sp. can only be confused with *F. harukae* Masumoto, 1988 from Mt. Trus Madi (Sabah, N Borneo), but is distinctly characterized by the different shape of the aedeagus (compare Fig. 9 with Masumoto 1998: figs. 29–30). In *F. harukae* the pronotum is dark blue and more convex and the elytra are purple.

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Revision of the genus *Herbertfranziella* Kaszab and description of the new genus *Nepalofranziella* of Himalayan Dichillina (Coleoptera: Tenebrionidae: Stenosini)

René Fouquè

Abstract

The species of the genus *Herbertfranziella* (Kaszab, 1973) (Coleoptera: Tenebrionidae: Stenosini) are revised and five new species are described. *Nepalofranziella* **n. gen.** with two new species is described. Diagnostic characters are illustrated. Keys to all species of *Herbertfranziella*, *Nepalofranziella*, and allied genera of Himalayan Dichillina are provided. – New species: *H. almorensis* **n. sp.** (India), *H. bhimtaleica* **n. sp.** (India), *H. brancuccii* **n. sp.** (India), *H. himalayica* **n. sp.** (Nepal), *H. loebli* **n. sp.** (India), *N. kaszabi* **n. sp.** (Nepal), *N. schawalleri* **n. sp.** (Nepal). A neotype of *Herbertfranziella janushevi* Medvedev, 1991 is designated. *Herbertfranziella* is recorded for the first time from Bhutan.

Keywords: Coleoptera, Tenebrionidae, Stenosini, *Herbertfranziella*, *Herbertfranzia*, *Nepalofranziella*, new genus, new species, neotype designation, India, Nepal, Bhutan, Pakistan, Tajikistan.

Zusammenfassung

Die Arten der Gattung *Herbertfranziella* (Kaszab, 1973) (Coleoptera: Tenebrionidae: Stenosini) werden revidiert und fünf neue Arten beschrieben. *Nepalofranziella* **n. gen.** mit zwei neuen Arten wird beschrieben. Die diagnostischen Merkmale werden abgebildet. Bestimmungsschlüssel für alle Arten der Gattungen *Herbertfranziella* und *Nepalofranziella* sowie für die verwandten Gattungen der Dichillina des Himalaya werden aufgestellt. – Neue Arten: *H. almorensis* **n. sp.** (Indien), *H. bhimtaleica* **n. sp.** (Indien), *H. brancuccii* **n. sp.** (Indien), *H. himalayica* **n. sp.** (Nepal), *H. loebli* **n. sp.** (Indien), *N. kaszabi* **n. sp.** (Nepal), *N. schawalleri* **n. sp.** (Nepal). Eine Neotype von *Herbertfranziella janushevi* Medvedev, 1991 wird festgelegt. *Herbertfranziella* wird zum ersten Mal für die Fauna von Bhutan nachgewiesen.

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1 Introduction

The genus *Herbertfranziella* Kaszab, 1973 was described as a subgenus of *Herbertfranzia* Kaszab, 1973, based on specimens from Nepal collected by Prof. Herbert Franz. When describing *Herbertfranzia*, Kaszab (1973) distinguished two subgenera, each with one species, *H. (Herbertfranzia) nepalica* and *H. (Herbertfranziella) eutagenoides*, and illustrated pronotum, antenna and the dorsal view of the head.

The subgenus *Herbertfranziella* was raised to generic level by Medvedev (1991), who also described the new species *Herbertfranziella janushevi* from Tajikistan, and illustrated pronotum, antenna and the dorsal view of the head. Finally, Medvedev (1994) described *Herbertfranziella kumaona* from India (Uttaranchal), and published a key to the three species of the genus.

The known distribution of the genus *Herbertfranziella* (Fig. 1) covers Tajikistan (only the lost type specimen of *H. janushevi*), northern Pakistan (Dir, Swat, Chitral), northern India (Himachal Pradesh, Uttaranchal), Nepal and now also Bhutan. The specimens were collected from altitudes between 1300 and 3200 m, all are flightless.

Only scarce information exists on the method of collecting. Kaszab (1975a) mentioned four specimens of *H. eutagenoides* collected in Nepal near Chauta (= Chautha) by H. Franz, under a shady rock wall in thick humus layers under a nut tree. I have not seen this material so this locality is not included in the map. The lost type of *H. janushevi* was also collected under a nut tree (*Juglans re-*

gia). Most species of the tribe Stenosini prefer places under stones in the shadow of solitary trees, at forest edges or under trees in steppe zones. I have collected *H. himalayica* in the Annapurna range near Pisang at an altitude of 3200 m under flat stones in the shadow of *Pinus*. The beetles occur on the lower surface of the stones and also in the detritus below.

During my previous work on the genus *Pseudethas* I looked for other new species and specimens in the borrowed materials erroneously determined as *Pseudethas* spp. Two interesting specimens were found. Herein I describe them as two new species of a new genus, *Nepalofranziella*. One of them was labelled by Kaszab 1985 as *Stenosis* sp. n., the other by Bečvář 2000 as *Dichillus* sp.

The genus *Herbertfranziella* is characterized by rounded and elongate elytra with fine convex intervals without keels. The humeral corner of the elytra is created by interval 9. The elytral base is mostly wider than the pronotal base. The tempora are widest at the posterior margin of the eyes then shortly almost parallel or narrowed in a gentle arch towards the cervix. Setae on elytra are simply tapering. All male tibiae have small inner subapical teeth. Hindwings are absent. Body length 2.25–3.30 mm.

The genus *Nepalofranziella* is characterized by elliptical elytra with fine convex intervals without keels. Interval 9 of the elytra is without humeral corner. The elytral base is as wide as the pronotal base. The tempora are almost parallel shortly after posterior margin of the eyes then narrowed in a gentle arch towards the cervix. The setae on the elytra are erect and more or less clavate, sometimes only on the apical region of elytra. All male tibiae have small inner subapical teeth (female tibiae unknown). Body length 2.95–3.40 mm.

The genus *Herbertfranzia* is characterized by oval elytra with convex intervals, with keeled intervals 7 and 9. The humeral corner of the elytra is created by interval 7. The elytral base is hardly wider than the pronotal base. The tempora are almost parallel shortly after posterior margin of eyes, then markedly narrowed to cervix. All male and female tibiae without inner subapical teeth.

For the sake of completeness I mention here the monotypic genus *Herbertfranzia*, which is known from Nepal (Fig. 1) from altitudes between 300 and 2500 m. The genera *Herbertfranziella* and *Nepalofranziella* are similar to the genera *Pseudethas* and *Herbertfranzia* in the subtribe Dichillina (see keys, chapter 7).

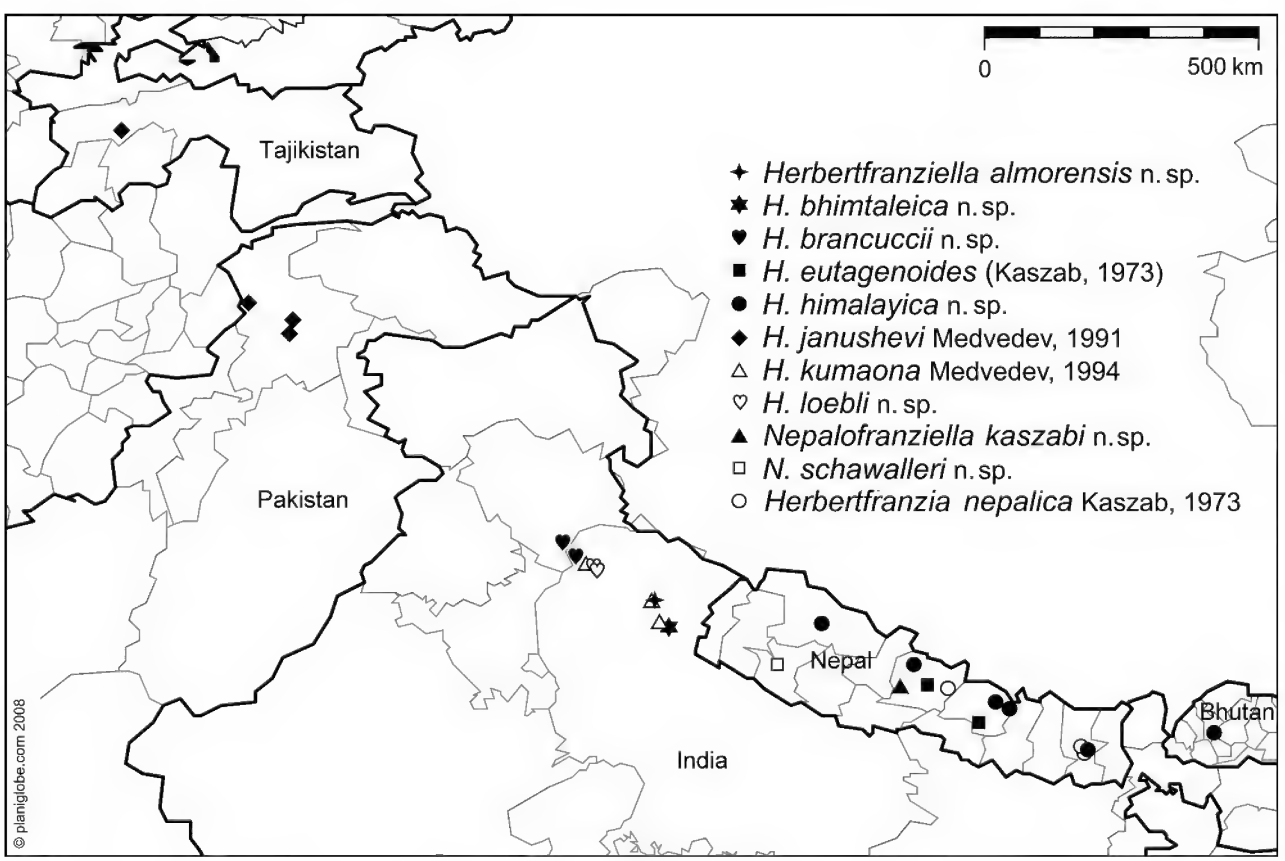

Fig. 1. Distribution of species of *Herbertfranziella*, *Nepalofranziella* and *Herbertfranzia*.

Acronyms of repositories

BMNH The Natural History Museum, London, U.K. (MAX BARCLAY)
CAPE Collection ANDREAS PÜTZ, Eisenhüttenstadt, Germany
CBS Collection STANISLAV BEČVÁŘ, České Budějovice, Czech Republic
CFR Collection RENÉ FOUQUÈ, Liberec, Czech Republic
HNHM Hungarian Natural History Museum, Budapest, Hungary (Dr. OTTÓ MERKL)
MHNG Muséum d'Histoire Naturelle, Genève, Switzerland (Dr. GIULIO CUCCODORO)
MNHN Muséum National d'Histoire Naturelle, Paris, France (ANTOINE MANTILLERI)
NHMB Naturhistorisches Museum, Basel, Switzerland (Dr. MICHEL BRANCUCCI, ISABELLE ZÜRCHER)
SMNS Staatliches Museum für Naturkunde, Stuttgart, Germany (Dr. WOLFGANG SCHAWALLER)
ZIN Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (MARK GABRIELEVICH VOLKOVICH)

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2 Methods

Length of the head is measured from the anterior margin of the clypeus to the cervix. Length of the elytra is measured from the humeral corner to the apex. Length of the pronotum is measured along the midline. Width of the elytral base is measured across the top of the humeral corners.

In the lists of materials, some localities are not cited in the original spelling of the labels, but are given in a standardized form.

The photographs were taken using a Canon EOS 550D and Helicon SW for composition of approximately 30 photos. The photo of the lost holotype of *H. janushevi* was taken with a Nikon E4500. Microscope MSB10 with a 100x magnification was used for studying the specimens.

The map is created with Planiglobe – digital vector map creator (http://www.planiglobe.com) and enhanced with CorelDRAW.

3 Previously known species of *Herbertfranziella*

Herbertfranziella eutagenoides (Kaszab, 1973) (Figs. 5, 20, 31)

Herbertfranzia (Herbertfranziella) eutagenoides Kaszab, 1973 – KASZAB 1973: 29.
Herbertfranziella eutagenoides – MEDVEDEV 1991: 559.

Studied type material: Nepal, Phulchoki, Kathmandu, IX.–X.1971, leg. H. FRANZ, 3 paratypes (one of it ♂) HNHM, 1 paratype MNHN.

New material: Nepal, Latipur Distr., Phulchoki, 2600 m, 14.X.1983, leg. A. SMETANA & I. LÖBL, 1 ex. CFR. – Nepal, Latipur Distr., Phulchoki, 2550–2700 m, 13.–17.X.1983, leg. A. SMETANA & I. LÖBL, 1 ex. MHNG. – Nepal, Manaslu Mts., S of Bara Pokhari, 2000 m, 7.IV.2003, leg. J. SCHMIDT, 2 ♂♂ SMNS.

Redescription: Body length 2.4–2.7 mm, body width 0.8–0.9 mm. – Body, legs and antennae rusty brown. Setae decumbent and fine. – Head length/width ratio as 35 : 32, head widest at half eye length before anterior margin of eyes. Tempora widest at posterior margin of eyes, from there gently arched to cervix. Genae almost parallel from posterior margin of eyes to widest point, from there gently arched to clypeus. Clypeus rounded. Two distinct impressions on frons. Ratio of head/cervix widths as 32 : 25. Eyes completely divided by genae, dorsal part with about 6 facets, ventral part with about 5 facets. Punctation rough and rounded, punctures almost confluent, smaller towards frons, with light forward directed setae, twice as long as puncture diameter. – Antennae (Fig. 20): densely and lightly haired; setae on middle antennomeres as long as ¾ length of antennomeres; antennomeres 2–11 combined twice as long as head width; antennomeres club-shaped; antennomeres 4–9 more rounded; last antennomere truncate latero-apically; antennomeres 3, 10 and 11 considerably larger than the others; length ratio of antennomeres 2–11 as 4.8 : 5.5 : 5 : 4.3 : 4 : 4 : 4 : 4.3 : 5.5 : 7.5, width ratio as 4.3 : 4.5 : 4.5 : 4.5 : 4 : 4 : 4 : 4.3 : 5 : 4.8. – Pronotum slightly straight, arched laterally, hardly longer than wide (39 : 37), widest at anterior third; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 32 : 33 : 37 : 29. Anterior corners almost rectangular, not protruding. Posterior corners obtusely rounded. Base convex. Anterior margin straight. Punctation dense and rounded, punctures almost touching each other, slightly larger than on head, with light forward directed setae, setae twice as long as puncture diameter. Punctural interspaces glossy. – Elytra with arched sides; 2.8 times as long, 1.7 times as wide as pronotum, widest in the middle; elytral length/width ratio as 110 : 61. Base markedly concave, hardly wider than pronotal base (30 : 29). Each elytron with 10 rows of punctures, 8 on dorsal side, 2 on deflexed part; interval 9 keeled, forming rounded indistinct humeral corner; all intervals gently arched. Punctures deep, larger than on pronotum. Distance between punctures in row 2 equals half of puncture diameter. Punctural interspaces glossy, each interval with one row of fine punctures with light decumbent setae twice as long as puncture diameter. Scutellum very small; scutellar row with five punctures; scutellar row vanishing after length of one third of width of elytral base. Epipleura with one row of punctures throughout whole length, punctures somewhat smaller than in row 10, smaller towards apex. – Aedeagus (Fig. 31): length approximately 0.51 mm, with a few fine and short apical setae. – Abdomen: punctures

shallow, first ventrite with punctures smaller than on epipleura, distance between punctures equals ½–1 of puncture diameter; second ventrite with punctures of half size as on epipleura, distance between punctures equals 1–2 puncture diameters.

Diagnosis: The almost equal width of elytral base and pronotal base is distinctive. This character is shared only with *H. bhimtaleica* n. sp. from which it differs by the shape of the humeral corners of elytra and club-shaped antennomeres.

Distribution: Nepal.

Herbertfranziella janushevi Medvedev, 1991 (Figs. 8, 9, 22, 33)

Herbertfranziella janushevi Medvedev, 1991 – Medvedev 1991: 560.

Studied type material: Holotype (♂): Tajikistan, Surhku Hills, hillside to Vakhsh river, forest vegetation, under *Juglans regia*, 31.V.1974, leg. W. Janusz. The holotype is irretrievably lost. – Neotype (♂): Pakistan, Dir, Lawarai Pass, 2700 m, 21.V.1983, leg. C Besuchet & I. Löbl, ZIN (originally MHNG), here designated (see Remarks below).

New material: Pakistan, Dir, Lawarai Pass, 2700–3300 m, 28.VI.1982, leg. D. Erber & W. Heinz, 1 ♀ SMNS. – Pakistan, Dir, Lawarai Pass, 2700 m, 21.V.1983, leg. C. Besuchet & I. Löbl, 4 ex. MHNG, 1 ex. SMNS. – Pakistan, Dir, Lawarai Pass, 3000 m, 21.V.1983, leg. C. Besuchet & I. Löbl, 126 ex. MHNG, 3 ex. SMNS, 8 ex. CBS, 5 ex. CFR. – Pakistan, Chitral, Lawarai Pass, 2600 m, 23.V.1983, leg. C. Besuchet & I. Löbl, 2 ex. MHNG. – Pakistan, Swat, Malam Jabba, 2500–2600 m, 18.V.1983, leg. C. Besuchet & I. Löbl, 12 ex. MHNG, 2 ex. SMNS, 1 ex. CFR. – Pakistan, Swat, S Miandam, 2400–2500 m, 17.V.1983, leg. C. Besuchet & I. Löbl, 1 ex. SMNS.

Redescription: Body length 2.25–2.85 mm, body width 0.75–0.95 mm. – Body brown to rusty brown, antennae and legs rusty brown. Setae decumbent and fine. – Head length/width ratio as 30 : 30, head widest at half eye length before anterior margin of eyes. Tempora almost parallel from posterior margin of eyes over a distance of half eye length, then slightly narrowing towards cervix; widest at posterior margin of eyes. Genae widening in a straight line from posterior margin of eyes to widest part of head, then narrowing in a straight line towards clypeus. Clypeus rounded. Two impressions on frons. Ratio of head/cervix widths as 30 : 23. Eyes completely divided by genae, dorsal part with about 6 facets, ventral part with about 5 facets. Punctation fine and dense, punctures almost touching each other. Setae fine, light, directed anteriorly, 1.5 times as long as puncture diameter. – Antennae (Fig. 22): densely and lightly haired; setae on middle antennomeres as long as half length of antennomeres; antennomeres 2–11 combined twice as long as width of pronotal base; antennomeres 1–9 club-shaped, 10 trapezoidal, last antennomere truncate latero-apically; antennomeres 3, 10 and 11 considerably larger than the others; length ratio of antennomeres 2–11 as 4.5 : 6 : 5 : 4.3 : 4.3 : 4.3 : 4 : 4 : 5.5 : 8, width ratio as 3.8 : 3.8 : 4 : 4 : 4.3 : 4.3 : 4.3 : 4.5 : 5.5 : 5.5. – Pronotum heart-shaped, slightly shorter than wide (33 : 34), widest at anterior third; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 30 : 29 : 34 : 26. Anterior corners slightly protruding, obtusely rounded. Posterior corners markedly obtuse. Anterior margin straight. Base considerably convex. Punctation rounded, rougher than on head. Punctures in the middle almost touching each other, sparser towards lateral margin. Pronotum with fine light setae twice as long as puncture diameter. – Elytra slightly flattened, almost parallel-sided in the middle third; 3.0 times as long, 1.6 times as wide as pronotum, widest in the middle; elytral length/width ratio as 100 : 54. Base concave, wider than pronotal base (29 : 26). Each elytron with 10 rows of punctures, 8 on dorsal side, 2 on deflexed part; interval 9 forming rounded humeral corner; all intervals gently arched. Punctures slightly larger than on pronotum, almost confluent. Distance between punctures in row 2 approximately equal to puncture diameter. Punctural interspaces glossy, gently wrinkled, each interval with one row of light, fine setae 1.5 times as long as puncture diameter. Scutellum very small; scutellar row with four punctures; scutellar row vanishing after length of one third of width of elytral base. Epipleura with one row of punctures throughout whole length, punctures smaller than in row 10, almost confluent from middle to apex. – Aedeagus (Fig. 33): length approximately 0.5 mm, with a few very fine apical setae. – Abdomen: first ventrite with punctures smaller than on epipleura, distance between punctures equals 1–2 puncture diameters; last ventrite with distance between punctures equal to puncture diameter. Setae twice as long as puncture diameter.

Diagnosis: The shorter than wide pronotum is distinctive. This character is shared only with *H. himalayica* n. sp. from which *H. janushevi* differs by the rounded humeral corners of the elytra, and by the fine decumbent setae, missing in the puncture rows.

Remarks: In the large series of specimens that I studied, some variation in the shape of the pronotum was observed, especially in the position of the widest point, and also in the colouration, which varies from rusty to brown. – Neotype designation: When I had the holotype on loan for the first time (the only specimen known to me at that time), I could not take good photographs, but I could compare it with other material, mainly from MHNG. Unfortunately, when the holotype was borrowed from the ZIN for the second time in order to produce a better photograph, the box with material was stolen. Therefore, a neotype of *H. janushevi* Medvedev, 1991 is designated. For the photo of the lost holotype see Fig. 8.

Distribution: Tajikistan, northern Pakistan (Dir, Swat, Chitral).

Herbertfranziella kumaona Medvedev, 1994
(Figs. 7, 23, 34)

Herbertfranziella kumaona Medvedev, 1994 – MEDVEDEV 1994: 852.

Studied type material: India, Uttaranchal (labelled: U. P.), Kumaon, W Almora, VI.1917, leg. H. G. CHAMPION, ♀ holotype BMNH.

New material: India, Uttaranchal (labelled: U. P.), Kumaon, W Almora, VI.1917, leg. H. G. CHAMPION, 1 ex. BMNH. – India, Nainital, W Almora, leg. H. G. CHAMPION, 1 ex. BMNH. – India, Uttaranchal (labelled: Uttar Pradesh), Mussoorie, Dhanolt, 2250 m, 11.VII.1989, leg. A. RIEDEL, 1 ♂ SMNS.

Redescription: Body length 2.7–3.2 mm, body width 0.90–1.05 mm. – Body brown, legs and antennae rusty brown. Setae decumbent and fine. – Head length/width ratio as 42 : 36, head widest at half eye length before anterior margin of eyes. Tempora widest at posterior margin of eyes, from there gently arched to cervix. Genae slightly widening from posterior margin of eyes to widest part of head, where they are rounded, then running straight towards clypeus. Clypeus rounded. Two distinct impressions on frons. Ratio of head/cervix widths as 36 : 30. Eyes completely divided by genae, dorsal part with about 6 facets, ventral part with about 5 facets. Punctures almost confluent, rounded, on vertex drop-shaped; with fine light forward directed setae, twice as long as puncture diameter. – Antennae (Fig. 23): densely and lightly haired; setae on middle antennomeres as long as ¾ length of antennomeres; antennomeres 2–11 combined twice as long as head width; antennomeres club-shaped; last antennomere truncate latero-apically; length ratio of antennomeres 2–11 as 5 : 5.5 : 4.8 : 4.3 : 4.3 : 4.3 : 4.3 : 4.5 : 5.8 : 7.8, width ratio as 3.5 : 3.5 : 3.5 : 3.5 : 3.5 : 3.5 : 3.5 : 3.8 : 4 : 4. – Pronotum with lateral margins rounded, longer than wide (46 : 42), widest at anterior quarter; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 36 : 37 : 42 : 32. Anterior corners rectangular. Posterior corners obtusely rounded. Anterior margin slightly concave near corners, convex in the middle; anterior corners not protruding. Base convex. Punctation denser than on head, punctures somewhat drop-shaped with light forward directed setae, distance between punctures less than half of puncture diameter, setae twice as long as puncture diameter. – Elytra rounded, 3.0 times as long, 1.8 times as wide as pronotum, widest just posterior to the middle; elytral length/width ratio as 136 : 75. Base markedly concave, much wider than pronotal base (42 : 32). Each elytron with 10 rows of punctures; interval 9 forming humeral corner; all intervals gently arched, interval 9 keeled. Punctures coarser than on pronotum; distance between punctures in row 2 equals half of puncture diameter. Punctural interspaces glossy and gently wrinkled, each interval with one row of light setae 1.5 times as long as puncture diameter. Scutellum very small; scutellar row with three punctures; scutellar row vanishing after length of one quarter of width of elytral base. Epipleura with one row of punctures throughout whole length, punctures smaller than in row 10, confluent from middle to apex. – Aedeagus (Fig. 34): length approximately 0.85 mm, with a few very fine apical setae. – Abdomen: first ventrite with smaller punctures than on epipleura, distance between punctures equals 1.5 puncture diameters; punctation denser towards last ventrite. Setae fine, 1.5 times as long as puncture diameter.

Diagnosis: This species has the elytral base markedly wider than the pronotal base and the pronotum longer than wide, similar as in *H. almorensis* n. sp. and *H. brancuccii* n. sp. From *H. almorensis* n. sp. it differs by the punctures in row not confluent in a groove. From *H. brancuccii* n. sp. it differs by the lateral margin of the pronotum, which is entirely rounded (slightly concave before posterior corner in *H. brancuccii*). The shape of the aedeagus with trapezoidal apex is specific, and the setae on the apex are distinct.

Distribution: India (Uttaranchal).

4 New species of *Herbertfranziella*

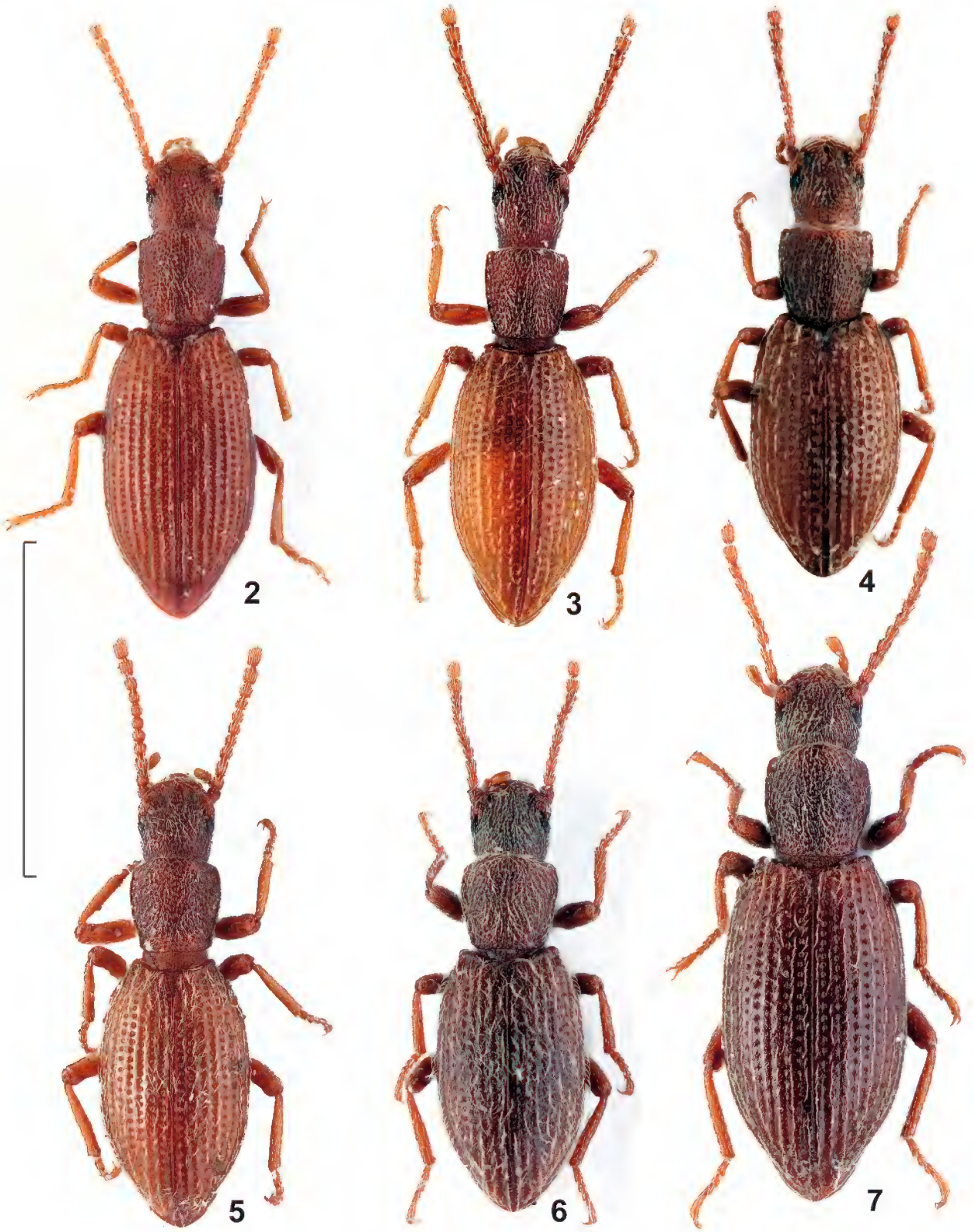
Herbertfranziella almorensis **n. sp.**
(Figs. 2, 17, 28)

Holotype (♀): India, Uttaranchal, Kumaon, W Almora, leg. H. G. CHAMPION, BMNH.

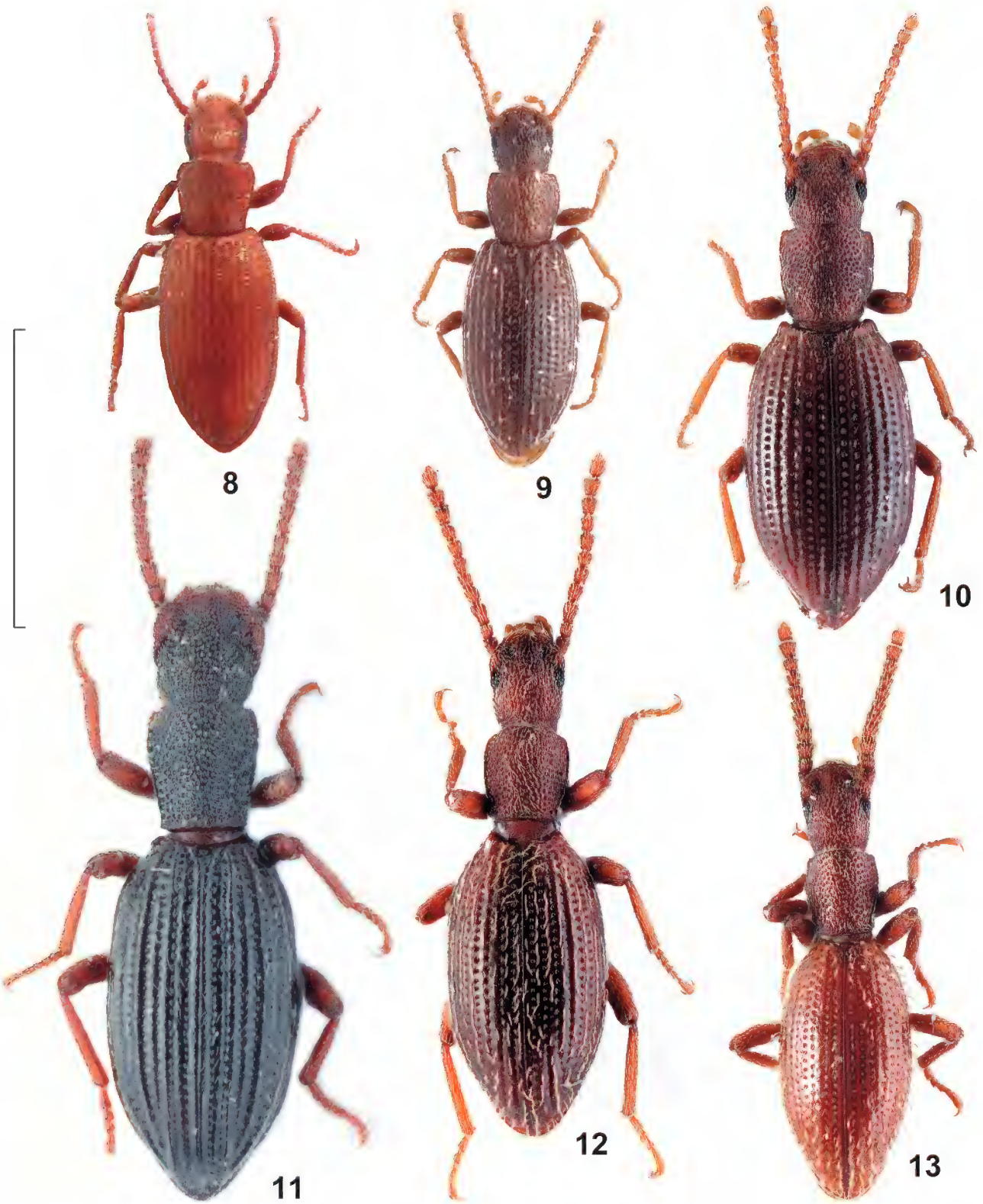
Paratype: Same data as holotype, 1 ♂ BMNH.

Etymology: Named after the village Almora where the type series was collected.

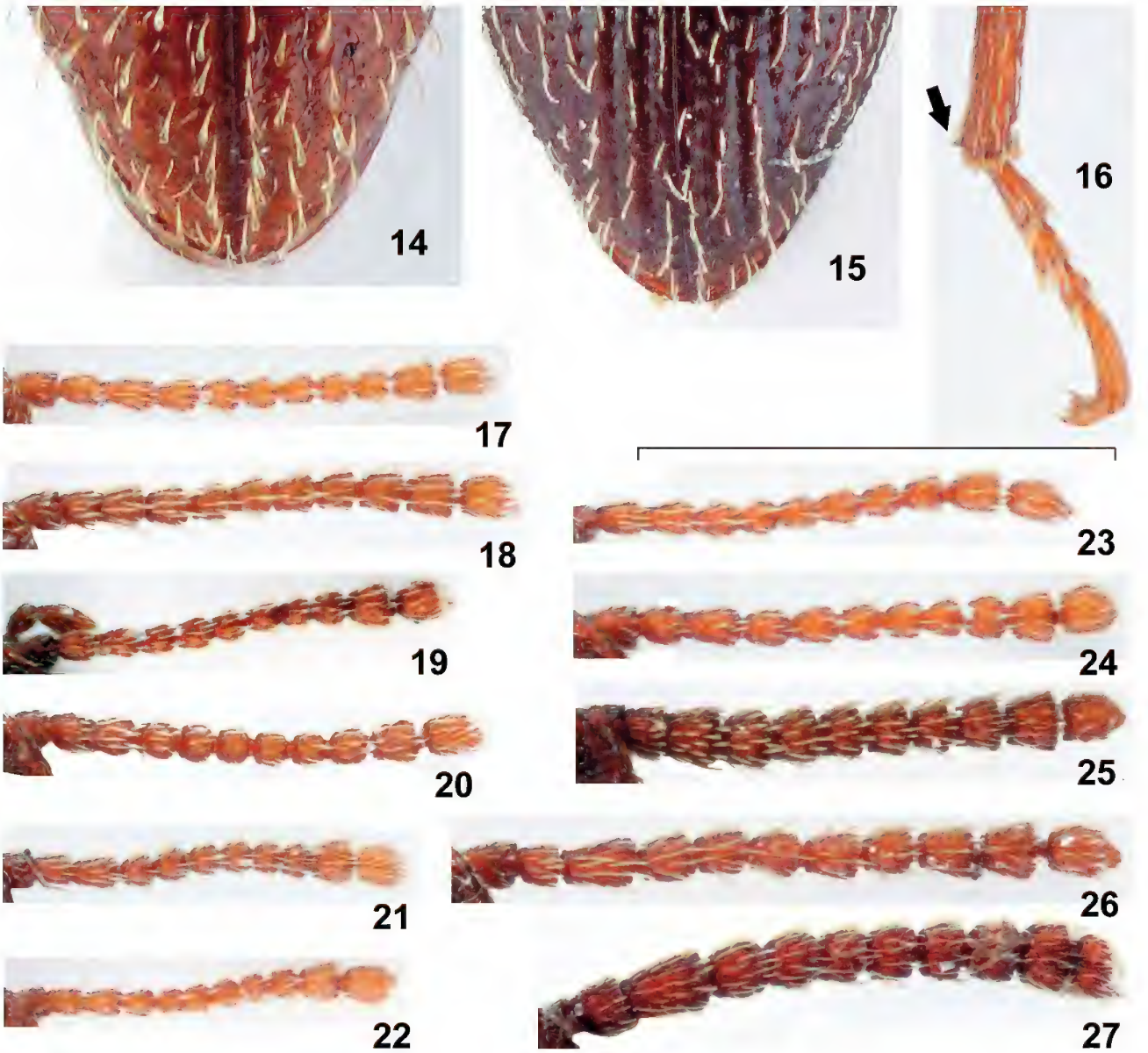
Description: Body length 2.7–2.8 mm, body width 0.85–0.90 mm. – Body rusty brown, legs and antennae lighter. Setae short, decumbent and fine. – Head length/width ratio as 35 : 33, widest at a distance of eye length before anterior margin of eyes. Tempora narrowed in a nearly straight line to cervix, widest at posterior margin of eyes. Genae widening from posterior margin of eyes to widest part of head; from widest part straight to clypeus, at half-length slightly concave. Clypeus straight. Two distinct impressions on frons. Ratio of head/cervix widths as 33 : 25. Eyes completely divided by genae, dorsal part with about 5 facets, ventral part with about 6 facets. Punctation dense; punctural interspaces distinctly wrinkled; with fine light forward directed setae, 1.5 times as long as puncture diameter. – Antennae (Fig. 17): densely and lightly haired;



Figs. 2–7. *Herbertfranziella* spp., dorsal view. – **2**. *H. almorensis* n. sp., holotype ♀, India (Uttaranchal). **3**. *H. bhimtaleica* n. sp., holotype ♂, India (Uttaranchal). **4**. *H. brancuccii* n. sp., holotype ♂, India (Himachal Pradesh). **5**. *H. eutagenoides*, paratype ♂, Nepal (Central region – Latipur). **6**. *H. himalayica* n. sp., holotype ♂, Nepal (Gandaki). **7**. *H. kumaona*, holotype ♀, India (Uttaranchal). – Scale: 2 mm.

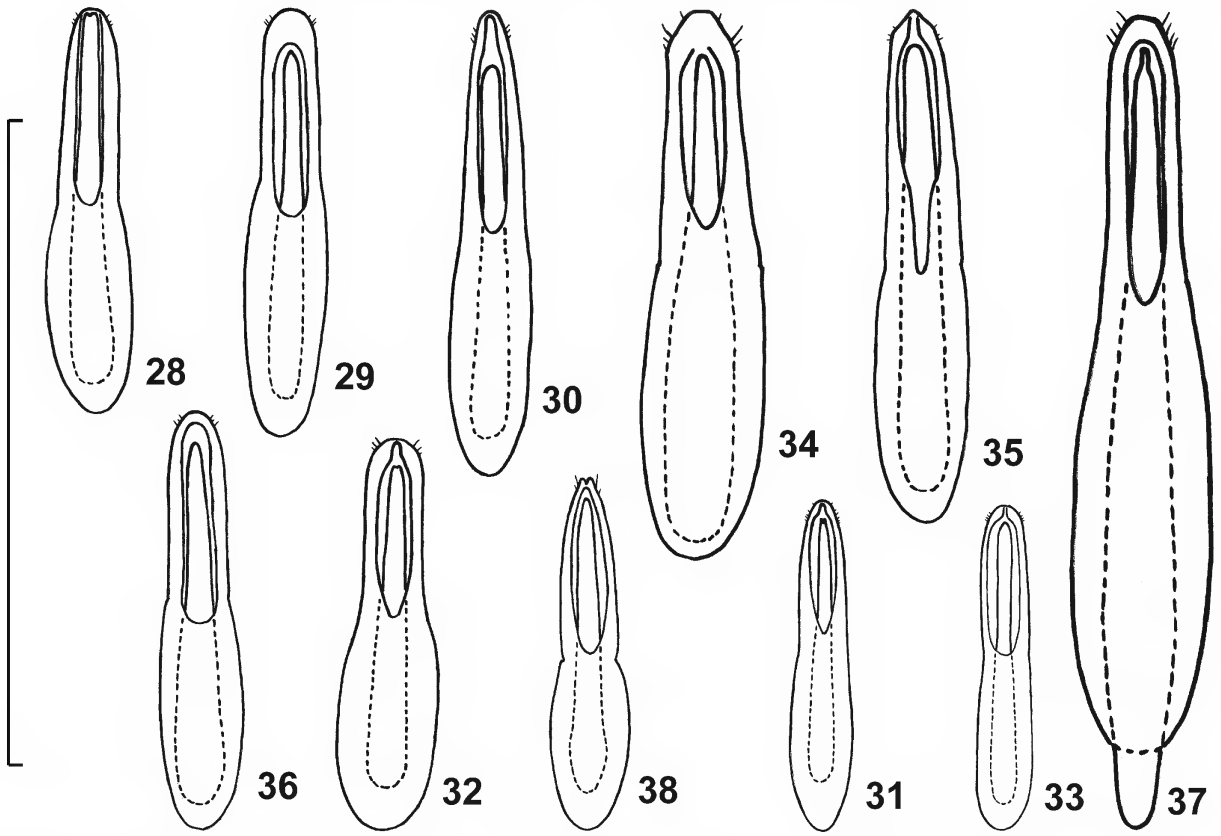


Figs. 8–13. *Herbertfranziella*, *Herbertfranzia* and *Nepalofranziella* spp., dorsal view. – **8**. *Herbertfranziella janushevi*, lost holotype ♂, Tajikistan. **9**. *H. janushevi*, neotype ♂, Pakistan (Dir). **10**. *H. loebli* n. sp., holotype ♀, India (Uttaranchal). **11**. *Herbertfranzia nepalica*, paratype ♀, Nepal. **12**. *Nepalofranziella schawalleri* n. sp., holotype ♂, Nepal. **13**. *N. kaszabi* n. sp., holotype ♂, Nepal. – Scale: 2 mm.



Figs. 14–27. – **14**. *Nepalofranziella kaszabi* n. sp., setae on apex of elytra. **15**. *N. schawalleri* n. sp., setae on apex of elytra. **16**. *N. schawalleri* n. sp., tooth on posterior tibia. – **17–27**. Antennae. – **17**. *Herbertfranziella almorensis* n. sp. **18**. *H. bhimtaleica* n. sp. **19**. *H. brancuccii* n. sp. **20**. *H. eutagenoides*. **21**. *H. himalayica* n. sp. **22**. *H. janushevi*. **23**. *H. kumaona*. **24**. *H. loebli* n. sp. **25**. *Nepalofranziella kaszabi* n. sp. **26**. *N. schawalleri* n. sp. **27**. *Herbertfranzia nepalica*. – Scale (17–27): 1 mm.

setae on middle antennomeres as long as half length of antennomeres; antennomeres 2–11 combined twice as long as width of pronotal base; antennomeres club-shaped; last antennomere truncate latero-apically; length ratio of antennomeres 2–11 as 5.3 : 6.5 : 5 : 5.3 : 4.3 : 4.3 : 4.3 : 4.3 : 5.8 : 7.3, width ratio as 4 : 4 : 4 : 4 : 3.8 : 3.8 : 3.8 : 3.8 : 4.5 : 4.5. – Pronotum longer than wide (42 : 37), widest at anterior third; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 33 : 36 : 37 : 30. Anterior corners rectangular. Posterior corners obtuse. Lateral margins slightly concave before posterior corners. Anterior margin convex. Base convex. Punctation same as on head; punctures almost confluent. Punctural interspaces wrinkled; punctures smaller towards lateral margin. Setae 1.5 times as long as puncture diameter. – Elytra 2.9 times as long, 1.8 times as wide as pronotum, widest in the middle; elytral length/width ratio as 123 : 65; lateral margins rounded, concave before humeral corners. Base concave, wider than pronotal base (35 : 30). Each elytron with 10 rows of punctures; interval 9 form-



Figs. 28–38. Aedeagus of *Herbertfranziella*, *Nepalofranziella* and *Herbertfranzia* spp. – **28**. *Herbertfranziella almorensis* n. sp. **29**. *H. bhimtaleica* n. sp. **30**. *H. brancuccii* n. sp. **31**. *H. eutagenoides*. **32**. *H. himalayica* n. sp. **33**. *H. janushevi*. **34**. *H. kumaona*. **35**. *H. loebli* n. sp. **36**. *Nepalofranziella kaszabi* n. sp. **37**. *N. schawalleri* n. sp. **38**. *Herbertfranzia nepalica*. – Scale: 1 mm.

ing rounded humeral corner; all intervals gently arched, wrinkled and each with one row of short light setae; interval 9 keeled. Punctures large and very dense, punctures in row almost confluent in a groove. Scutellum very small; scutellar row with four punctures; scutellar row vanishing after length of one quarter of width of elytral base. Epipleura with one row of punctures throughout whole length, punctures smaller than in row 10, smaller towards apex. – Aedeagus (Fig. 28): length approximately 0.63 mm, with a few very fine apical setae. – Abdomen: puncture diameter half as on row 10, distance between punctures less than puncture diameter.

Diagnosis: The row of punctures on the elytra is almost confluent in a groove. The genae are widening from posterior margin of eyes. All other species of the genus have parallel or almost parallel genae.

Herbertfranziella bhimtaleica **n. sp.**
(Figs. 3, 18, 29)

Holotype (♂): India, Uttaranchal (labelled: UP), Kumaon, Bhim Tal, 1500 m, 4.X.1979, leg. I. Löbl, MHNG.

Paratypes: Same data as holotype, 1 ♀ MHNG, 1 ♂ CBS. – India, Uttaranchal (labelled: UP), Bhim Tal, 1800 m, 4.X.1979, leg. I. Löbl, 1 ♂ SMNS.

Etymology: Named after Bhim Tal village where the type series was collected.

Description: Body length 2.75–2.90 mm, body width 0.85–0.90 mm. – Body rusty brown, legs and antennae lighter. Setae decumbent and fine. – Head length/width ratio as 38 : 32, head widest at half distance of eye length before anterior margin of eyes. Tempora widest at posterior margin of eyes, then narrowing in a gentle arch to cervix. Genae almost parallel from middle of eyes to widest part of head; from widest part rounded to clypeus. Clypeus rounded. Two distinct impressions on frons. Ratio of head/cervix widths as 32 : 24. Eyes reduced, completely divided by genae, dorsal part with about 7 facets, ventral part with about 6 facets. Punctation dense; punctures rounded, almost confluent; punctural interspaces glossy. Setae twice as long as puncture diameter. – Antennae (Fig. 18): densely and lightly haired; setae on middle antennomeres as long as ¾ length of antennomeres; antennomeres 2–11 com-

bined twice as long as head width; antennomeres trapezoidal; last antennomere truncate latero-apically; length ratio of antennomeres 2–11 as 4.5 : 5.3 : 5 : 5 : 5 : 5 : 4.5 : 5.5 : 5.8 : 7.5, width ratio as 4.3 : 4.5 : 4.5 : 4.5 : 4.5 : 4.5 : 4.8 : 4.8 : 5.3 : 5.5. – Pronotum longer than wide (37 : 35), widest at anterior quarter; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 32 : 31 : 35 : 27. Anterior corners rectangular, slightly arched. Posterior corners obtuse. Lateral margins gently arched. Anterior margin straight; anterior corners slightly protruding. Base slightly convex. Punctation denser than on head, punctures rounded, almost confluent with light forward directed setae, twice as long as puncture diameter. – Elytra arched, 3.1 times as long, 1.8 times as wide as pronotum, widest in the middle; elytral length/width ratio as 115 : 62. Base concave, as wide as base of pronotum. Each elytron with 10 rows of punctures; interval 9 forming sharp, obliquely directed humeral corner; all intervals gently arched, interval 9 keeled. Punctures rounded. Distance between punctures in row 2 half to one puncture diameter. Punctural interspaces glossy, with very fine punctures; on each interval one row of very gentle punctures with light setae. Setae twice as long as puncture diameter. Scutellum very small; scutellar row almost imperceptible, with 1–2 punctures; scutellar row vanishing after length of one eighth of width of elytral base. Epipleura with one row of punctures throughout whole length, confluent in a groove, punctures smaller than in row 10, smaller towards apex. – Aedeagus (Fig. 29): length approximately 0.66 mm, with very fine apical setae. – Abdomen: punctation very fine, punctures smaller than on epipleura, distance between punctures equals 2 puncture diameters.

Diagnosis: *H. bhimtaleica* n. sp. shares with *H. eutagenoides* the elytral base as wide as the pronotal base. All other species of the genus have the elytral base markedly wider than the pronotal base. The sharp obliquely directed humeral corners of the elytra and the trapezoidal shape of the antennomeres are distinctive.

Herbertfranziella brancuccii **n. sp.**
(Figs. 4, 19, 30)

Holotype (♂): India, Himachal Pradesh, Chopal–Khangna Nallah, 2250 m, 7.V.1977, leg. W. Wittmer & M. Brancucci, SMNS.

Paratypes: Same data as holotype, 1♂, 2♀♀ NHMB. – India, Uttaranchal, Chaktrata Distr., Konain, 2450 m, 24.–30.V.1922, 1♀ BMNH.

Etymology: Named in memory of Dr. Michel Brancucci (1950–2012), one of the collectors of the type series.

Description: Body length 2.50–3.05 mm, body width 0.85–0.90 mm. – Body rusty brown, legs and antennae lighter. Setae decumbent and fine. – Head length/width ratio as 35 : 32, head widest at a distance of half eye length before anterior margin of eyes. Tempora narrowing in an almost straight line to cervix, widest at posterior margin of eyes. Genae widening from posterior margin of eyes to widest part of head; from widest part in a gentle arch to clypeus. Clypeus rounded. Two distinct impressions on frons. Ratio of head/cervix widths as 32 : 27. Eyes markedly regulate, completely divided by genae, dorsal part with about 6 facets, ventral part with about 7 facets. Punctation dense, rounded and punctures almost confluent; punctural interspaces wrinkled; with fine light forward directed setae, 1.5 times as long as puncture diameter. – Antennae (Fig. 19): densely and lightly haired; setae on middle antennomeres as long as half length of antennomeres; antennomeres 2–11 combined twice as long as width of pronotal base; antennomeres club-shaped; last antennomere truncate latero-apically; length ratio of antennomeres 2–11 as 5.5 : 6.5 : 5 : 5.3 : 4.8 : 5 : 4.5 : 4.8 : 6.3 : 8.3, width ratio as 4 : 4.3 : 4 : 4.3 : 4 : 3.8 : 3.8 : 4.5 : 6 : 5.5. – Pronotum somewhat heart-shaped, hardly longer than wide (42 : 40), widest at anterior third; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 32 : 35 : 40 : 30. Anterior corners rectangular. Posterior corners obtuse. Lateral margins slightly concave before posterior corners. Anterior margin straight. Base convex. Punctures rounded and slightly larger than on head; punctures almost confluent. Punctural interspaces wrinkled. Setae 1.5 times as long as puncture diameter. – Elytra rounded, almost parallel in the middle third, 2.6 times as long, 1.6 times as wide as pronotum, widest in the middle; elytral length/width ratio as 110 : 64. Base concave, wider than pronotal base (34 : 30). Each elytron with 10 rows of punctures; interval 9 forming rounded humeral corner; all intervals gently arched, wrinkled and with one row of short light setae; interval 9 distinctly keeled. Punctures large and very dense, distance between punctures in row 2 smaller than half of puncture diameter. Punctural interspaces wrinkled. Scutellum very small; scutellar row with three punctures; scutellar row vanishing after length of one quarter of width of elytral base. Epipleura with one row of punctures throughout whole length, punctures smaller than in row 10, confluent in a groove, smaller towards apex. – Aedeagus (Fig. 30): length approximately 0.71 mm, with very fine apical setae. – Abdomen: first ventrite with fine punctures half as large as on middle of epipleura, distance between punctures equals 1.5 puncture diameters; on second to last ventrite punctures slightly smaller and distance between punctures one puncture diameter. Punctural interspaces on all ventrites wrinkled. Setae very fine.

Diagnosis: This species is similar to *H. almorensis* n. sp. and *H. kumaona* in having the elytral base markedly wider than the pronotal base and the pronotum longer than wide. Distinctive is the shape of the pronotum with straight

anterior margin, and the lateral margins slightly concave before posterior corners. The aedeagus is narrow and acute.

Herbertfranziella himalayica **n. sp.**
(Figs. 6, 21, 32)

Holotype (♂): Nepal, Gandaki Zone, Manang Distr., Lower Pisang, 3200 m, 4.V.2007, leg. R. & H. FOUQUÈ, CFR.

Paratypes: Same data as holotype, 74 ex. CFR, 2 ex. HNHM, 2 ex. MHNG, 2 ex. MNHN, 2 ex. BMNH, 2 ex. NHMB, 2 ex. SMNS, 2 ex. ZIN.

Other material: Nepal, Prov. Bagmati, Jangtang Ridge NE Barahbise, 3250 m, 5.V.1981, leg. I. LÖBL & A. SMETANA, 3 ex. SMNS, 3 ex. MHNG, 1 ex. CBS, 1 ex. CFR. – Nepal, Panchthar Distr., ridge between Sheltoti and Paniporua, deciduous forest, 2200–2450 m, 29.VIII.1983, leg. J. MARTENS & B. DAAMS, 1 ex. SMNS. – Nepal, Terai, Chitre, 27°07'N, 87°24'E (labelled: 26°07'N, 87°24'E – coordinates in India), 2150 m, 4.III.1962, forest leaf litter, leg. K. H. HYATT, BMNH Nepal Expedition, 1 ex. BMNH. – Nepal, Bagmati, Sindhupalchok, Gangjwal, 2500 m, 6.–7.VI.1989, leg. M. BRANCUCCI, 1 ex. NHMB. – Nepal, Jumla, Dampa, Pass to Chauta, leg. H. FRANZ, 1 ex. HNHM. – Bhutan, Dorjula, 3100 m, 3.IX.1976, leg. D. KHANDU, 1 ex. NHMB.

Etymology: Named after the Himalayas where the type series was collected.

Description: Body length 2.4–2.9 mm, body width 0.8–1.0 mm. – Body brown, legs and antennae lighter. Setae dense, long and erect. – Head length/width ratio as 37 : 34, head widest at a distance of half eye length before anterior margin of eyes. Tempora widest at posterior margin of eyes, from there gently arched to cervix. Genae almost parallel from posterior margin of eyes to widest part of head, from there in straight line to clypeus. Clypeus rounded. Two distinct impressions on frons. Ratio of head/cervix widths as 34 : 27. Eyes completely divided by genae, ventral part considerably reduced, dorsal part with about 7 facets, ventral part with about 4 facets. Punctation dense, rounded, punctures almost confluent, particularly towards clypeus. Setae on head 3 times as long as puncture diameter on vertex. – Antennae (Fig. 21): with light, dense and erect hairs; setae on middle antennomeres as long as ¾ length of antennomeres; antennomeres 2–11 combined twice as long as width of cervix; antennomeres club-shaped; antennomeres 4–9 more rounded; last antennomere truncate latero-apically and rounded; length ratio of antennomeres 2–11 as 5.5 : 6.5 : 4.8 : 4.8 : 4.3 : 4 : 4 : 4 : 6 : 7.5, width ratio as 4.3 : 4.3 : 4.5 : 4.8 : 4.3 : 4.3 : 4.3 : 4.8 : 6 : 5.5. – Pronotum somewhat shorter than wide (39 : 40), widest at anterior third; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 34 : 35 : 40 : 30. Anterior and posterior corners obtuse, markedly rounded. Lateral margins rounded. Anterior margin straight. Base slightly convex. Punctation rougher than on head, punctures almost confluent. Setae dense and long, three times as long as puncture diameter. – Elytra oval, 2.8 times as long, 1.6 times as wide as pronotum, widest in the middle; elytral length/width ratio as 110 : 62. Base markedly concave and wider than pronotal base (37 : 30). Each elytron with 10 rows of punctures; interval 9 forming rounded slightly obliquely directed humeral corner; all intervals gently arched, interval 9 keeled. Punctures of same size as on pronotum; distance between punctures in row 2 smaller than puncture diameter. Punctural interspaces with one row of long curved and erect setae; setae up to 4 times as long as puncture diameter. Punctures of each row also with one seta; these setae half as long as those on intervals, sometimes reduced on disk. Scutellum very small; scutellar row with three punctures; scutellar row vanishing after length of one fifth of width of elytral base. Epipleura with one row of punctures throughout whole length, confluent in a groove, punctures smaller than in row 10, largest in the middle, smaller towards apex. – Aedeagus (Fig. 32): length approximately 0.6 mm, with pairs of very small apical setae. – Abdomen: punctures dense and deep; first ventrite with punctures of same size as on middle of epipleura, distance between punctures half of puncture diameter; punctures gradually decreasing posteriorly from second ventrite on. Setae fine and long.

Diagnosis: The habitus of this new species is most similar to *H. eutagenoides* from which is differs considerably by the wide elytral base relative to the pronotal base. It differs from all other species of the genus by the very long setae on the elytral intervals and by the presence of shorter setae in the punctural rows, which can be reduced on the disk.

Remarks: In the studied material a few specimens from Nepal and one from Bhutan were also found, which I have identified as *H. himalayica*, but they are not included in type series. This is due to slight variations of specimens from different localities, including differences in the density and length of setae, and absence of the setae in punctural rows of the elytra, and in one specimen also in the colour of the body (black). More material from different localities are needed to decide their taxonomic status. However, these specimens surely do not belong to *H. eutagenoides* because of the width ratio of the elytral and pronotal base. – The specimen from Bhutan represents a new country record of the genus *Herbertfranziella*. This is the second genus and species of Stenosini known from Bhutan; the other is *Tagenostola turkestanica albovillosa* Koch, 1940 (KASZAB 1975b).

Herbertfranziella loebli **n. sp.**
(Figs. 10, 24, 35)

Holotype (♀): India, Uttaranchal, Garhwal Himal, 2 km E Dhanaulti, 2250 m, 21.X.1979, leg. I. LÖBL, MHNG.

Paratypes: Same data as holotype, 2♀♀ MHNG, 1♂ SMNS. – India, Uttaranchal, 10 km E Mussoorie, 20 km NE Dehra Dun, 2000 m, 7.X.1996, leg. A. Schulz & K. Vock, 2♀♀ CAPE. – India, 1863 (labelled: "63.47*"), leg. J. Bowring, 1♂ BMNH.

Etymology: Named in honour of Dr. Ivan Löbl, (Genève, Switzerland), collector of part of the type series.

Description: Body length 2.9–3.3 mm, body width 1.05–1.10 mm. – Body brown, legs and antennae lighter. Setae decumbent, short and fine. – Head length/width ratio as 39 : 38, head widest at a distance of half eye length before anterior margin of eyes. Tempora widest at posterior margin of eyes, then parallel to a distance half of eye length, then gently arched to cervix. Genae parallel from posterior third of eyes forward to distance of half eye length before anterior margin of eye, than narrowed in a straight line to clypeus. From back third of eye length genae narrowed to posterior margin of eye. Clypeus straight. Two distinct impressions on frons. Ratio of head/cervix widths as 38 : 32. Eyes pronounced, completely divided by genae, dorsal side with about 11 facets, ventral side with about 8 facets. Punctation rounded, punctures almost confluent; punctural interspaces wrinkled. Setae light, 1.5 times as long as puncture diameter. – Antennae (Fig. 24): densely and lightly haired; setae on middle antennomeres as long as half length of antennomeres; antennomeres 2–11 combined twice as long as head width behind posterior margin of eyes; antennomeres club-shaped; last antennomere truncate latero-apically; length ratio of antennomeres 2–11 as 4.8 : 6 : 5 : 5 : 4.5 : 4.5 : 4.3 : 4.8 : 5 : 6.8, width ratio as 4 : 4 : 4 : 4 : 4 : 4 : 4 : 4.8 : 5.3 : 5.3. – Pronotum longer than wide (46 : 43), widest at anterior third; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 38 : 40 : 43 : 35. Anterior corners rectangular. Posterior corners obtuse and rounded. Lateral margins gently arched. Anterior margin straight. Base convex. Punctation same as on head; punctures almost confluent; with light forward directed setae, 1.5 times as long as puncture diameter. – Elytra markedly arched; 3.2 times as long, 1.9 times as wide as pronotum, widest in the middle; elytral length/width ratio as 146 : 80. Base markedly concave, wider than pronotal base (40 : 35). Each elytron with 10 rows of punctures; interval 9 forming distinct humeral corner; lateral margins markedly concave behind corners in dorsal view; all intervals gently arched, lateral intervals arched, interval 9 keeled. Punctures larger than on pronotum. Distance between punctures in row 2 equals half of puncture diameter. Punctural interspaces almost glazed, each interval with one row of very small punctures with light setae. Scutellum very small; scutellar row with three punctures; scutellar row vanishing after length of one fifth of width of elytral base. Epipleura with one row of punctures throughout whole length, punctures smaller than in row 10, smaller towards apex. – Aedeagus (Fig. 35): length approximately 0.8 mm, with a very fine pair of apical setae. – Abdomen: punctures on ventrites 1 and 2 of same size as on base of epipleura, deep and almost confluent, on second to last ventrite punctures smaller.

Diagnosis: This species differs from all congeners by the non-reduced dorsal part of the eyes. The elytra are almost twice as wide as the pronotum. The apex of the aedeagus is triangular.

5 New genus *Nepalofranziella* and new species

Nepalofranziella n. gen.

Type species: *Nepalofranziella kaszabi* n. sp. by present designation.

Etymology: Combination of Nepal (where the new species were collected) and in honour of Prof. Herbert Franz (with reference to the genus *Herbertfranziella*).

Diagnosis: Body length 2.95–3.40 mm. Eyes completely divided by genae; tempora widest at posterior margin of eyes; two impressions on frons; pronotum without impression; elytra elliptical, with 10 rows of punctures, intervals flat or finely convex; elytra without humeral corners; intervals with setae erect and clavate, sometimes only on apex (Figs. 14, 15); base of elytra convex and as wide as pronotal base; epipleura with one row of punctures; all male tibiae with a small inner subapical tooth (Fig. 16) (female tibiae unknown); hindwings absent; aedeagus with setae on apex.

Remarks: *Nepalofranziella* n. gen. belongs to the subtribe Dichillina of the tribe Stenosini. Its position in Dichillina is based on the eyes divided by genae (Reitter 1916). – *Nepalofranziella* is very similar to *Herbertfranziella* Kaszab, 1973. It differs by the equal width of pronotal and elytral base, absence of humeral corners and shape and position of setae on the elytra. *Nepalofranziella* n. gen. and *Herbertfranziella* differ from other related genera of the subtribe Dichillina (*Herbertfranzia* Kaszab, 1973, *Pseudethas* Fairmaire, 1896 and *Indochillus* Koch, 1941) by the shape of tempora, having reduced eyes, head without supraorbital keel, pronotum without impressions or keels and elytra without keels. – The genus *Nepalofranziella* is known only from two specimens representing two species.

Distribution: Nepal.

Nepalofranziella kaszabi n. sp.
(Figs. 13, 14, 25, 36)

Holotype (♂): Nepal, Kharkhore south, Pokhara, leg. H. Franz, HNHM.

Etymology: Named in honour of Dr. ZOLTÁN KASZAB (1915–1986), expert of Tenebrionidae who recognized 1985 this specimen as representing a new species.

Description: Body length 2.95 mm, body width 0.85 mm. – Body, legs and antennae rusty brown, palps lighter. Elytra with distinct erect yellow setae. – Head length/width ratio as 42 : 34, head widest at a distance of half eye length before anterior margin of eyes. Tempora almost parallel behind eye over a distance of one eye length, then gently narrowing towards the cervix, widest at posterior margin of eyes. Genae parallel, slightly widening from posterior margin of eyes to widest part of head, from there in a regular arch to clypeus. Clypeus rounded. Two distinct impressions on frons. Ratio of head/cervix widths as 34 : 24. Eyes completely divided by genae, dorsal part with about 8 facets, ventral part with about 5 facets. Punctures on vertex coarse and rounded; punctures on frons half size as on vertex, almost confluent. Head with yellow, anteriorly directed setae 1.5 times as long as puncture diameter. – Antennae (Fig. 25): with short, light, decumbent hairs; setae on middle antennomeres as long as half length of antennomeres; antennomeres 2–11 combined twice as long as width of pronotum; antennomeres strong and trapezoidal; last antennomere truncate latero-apically; antennomeres 2–10 wider than long; length ratio of antennomeres 2–11 as 5 : 6 : 5.5 : 5.5 : 5 : 4.8 : 4 : 5 : 5.8 : 7, width ratio as 5.5 : 6.5 : 6.3 : 5.8 : 5.8 : 5.5 : 5.5 : 5.8 : 6.5 : 5. – Pronotum heart-shaped, longer than wide (41 : 34), widest in the middle; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 34 : 31 : 34 : 26. Anterior corners obtuse. Posterior corners obtuse. Anterior margin straight. Base concave. Punctures on pronotum larger and denser as on head, punctures almost confluent. Light setae of punctures anteriorly directed, twice as long as puncture diameter. – Elytra elliptical, 2.9 times as long, 1.9 times as wide as pronotum, widest in the middle; elytral length/width ratio as 120 : 64; base just as wide as base of pronotum. Base concave, without humeral corners. Each elytron with 10 rows of punctures; intervals flat, only lateral intervals somewhat convex. Punctures of same size as on pronotum; distance between punctures in row 2 equals one-third of puncture diameter. Punctural interspaces glossy. Punctural rows with setae as long as puncture diameter; intervals between punctures with a row of yellow, erect, flattened and apically expanded setae which are three times as long as the setae of the punctural rows (Fig. 14). Scutellum triangular; scutellar row small. Epipleura with one row of punctures getting smaller posteriad, at base smaller as in elytral row 10, in anterior third confluent in a groove. – Legs: all male tibiae with a small inner subapical tooth (female tibiae unknown). – Hindwings absent. – Aedeagus (Fig. 36): length approximately 0.64 mm, with tiny apical setae. – Abdomen: punctures on ventrite 1 fine, distance between punctures twice as wide as puncture diameter, ventrites 2 and 3 with larger and deeper punctures than ventrite 1, distance between punctures equals puncture diameter.

Diagnosis: This species is distinctive in having thick antennal antennomeres 2–10 which are wider than long. Setae on elytral intervals erect and clavate. Length ratio of body/aedeagus as 4.6 : 1.

Nepalofranziella schawalleri **n. sp.**
(Figs. 12, 15, 16, 26, 37)

Holotype (♂): Nepal, Prov. Bheri, Distr. Surkhet, N Surkhet, 1600–2000 m, 28.V.1998, leg. W. SCHAWALLER, SMNS.

Etymology: Named in honour of Dr. WOLFGANG SCHAWALLER (Stuttgart, Germany), expert of Tenebrionidae and collector of the holotype.

Description: Body length 3.4 mm, body width 1.1 mm. – Body brown, legs, antennae and palps lighter. Elytra with decumbent yellow setae, on apex erect. – Head length/width ratio as 47 : 37, head widest at a distance of half eye length before anterior margin of eyes. Tempora almost parallel behind eye over a distance of one and half eye length, then gently narrowing towards the cervix. Genae from posterior margin of eyes slightly widening in a straight line to widest part of head, then arched and narrowing in a straight line to clypeus. Clypeus straight. Two impressions on frons. Ratio of head/cervix widths as 37 : 32. Eyes completely divided by genae, dorsal part with about 7 facets, ventral part with about 6 facets. Punctation on vertex coarse, punctures almost confluent. Punctural interspaces wrinkled. Head with fine, light, anteriorly directed setae twice as long as puncture diameter. – Antennae (Fig. 26): with light, fine hairs; setae on middle antennomeres as long as half length of antennomeres; antennomeres 2–11 combined 3 times as long as width of pronotal base; antennomeres elongate trapezoidal; last antennomere truncate latero-apically; length ratio of antennomeres 2–11 as 3.8 : 6 : 4.8 : 4.3 : 4.3 : 4.8 : 4.3 : 4.8 : 4.8 : 6.5, width ratio as 3.8 : 4.3 : 4 : 3.8 : 3.8 : 3.8 : 3.8 : 4 : 4.5 : 4.3. – Pronotum longer than wide (46 : 42), widest at anterior quarter; width ratio of head/anterior edges of pronotum/widest point of pronotum/posterior edges of pronotum as 37 : 33 : 42 : 31. Anterior corners obtuse and rounded. Posterior corners obtuse. Lateral margins slightly rounded, from widest part to base almost straight. Anterior margin almost straight. Base gently concave. Punctures on pronotum of same size as on vertex. Punctural interspaces wrinkled. Light setae of punctures anteriorly directed, twice as long as puncture diameter. – Elytra elliptical, 3.3 times as long, 1.9 times as wide as pronotum, widest in the middle; elytral length/width ratio as 150 : 80; base just as wide as base of pro-

notum. Base distinctly concave, without humeral corners. Each elytron with 10 rows of punctures; intervals finely convex, lateral intervals convex, interval 10 flattened. Punctures larger and deeper as on pronotum; distance between punctures in row 2 equals half of puncture diameter. Punctural interspaces gently wrinkled. Each interval with one row of yellow setae twice as long as puncture diameter, setae erect and slightly clavate on apical declivity (Fig. 15). Scutellum very small; scutellar row small. Epipleura with one row of punctures getting smaller posteriad, diameter at base smaller as in row 10. – Legs: all male tibiae with a small inner subapical tooth (Fig. 16) (female tibiae unknown). – Hindwings absent. – Aedeagus (Fig. 37): length approximately 1.15 mm, with tiny apical setae. – Abdomen: punctures on ventrite 1 smaller than on epipleura, distance between punctures equal to puncture diameter; ventrite 2 with punctures of same size as on ventrite 1, distance between punctures half of puncture diameter. Punctures smaller towards last ventrite.

Diagnosis: This species is distinguished from the former by the long, thin antennae, with antennomeres 2–10 longer than wide. Setae on elytral intervals slightly clavate only at the apex. Length ratio of body/aedeagus as 3 : 1.

6 Previously known species of *Herbertfranzia*

Herbertfranzia nepalica Kaszab, 1973
(Figs. 11, 27, 38)

Herbertfranzia (Herbertfranzia) nepalica Kaszab, 1973 – Kaszab 1973: 28.
Herbertfranzia nepalica – Medvedev 1994: 864.

Studied type material: Nepal, Barahbise Distr., Ting Sang La, leg. H. Franz, 1 paratype HNHM, 1 paratype MNHN.

New material: E Nepal, Thamur Valley, Dhankuta, 1150 m, 23.V.1983, leg. M. Brancucci, 1 ex. SMNS. – Nepal, Gorkha/Dhading Distr., Buri Gandaki, Jagat opposite Pangshing, 1650 m, farmland, 31.VII.1983, leg. J. Martens & W. Schawaller, 1 ex. SMNS. – Nepal, Dhading Distr., Thorpu to Kordunje, 1300–1400 m, 24.VII.1983, leg. J. Martens & W. Schawaller, 1 ♀ SMNS. – Nepal, Kosi, from Mangmaya (27°07'N, 87°15'E, 300 m) to Akibunkybeshi (27°12'N, 87°15'E, 400 m), 30.V.2001, NHMB expedition to Nepal, code 5, 8 ex. NHMB.

Distribution: Nepal.

7 Keys to the species of *Herbertfranziella*, *Nepalofranziella* and allied genera

Key to genera

1 Suborbital keels prominent. Anterior margin of clypeus concave, with small tooth (occasionally only slightly concave, without a tooth)..... ***Indochillus***
– Suborbital keels reduced or absent. Anterior margin of clypeus without tooth, convex or shortly straight..... **2**
2 Suborbital keels reduced..... **3**
– Suborbital keels completely absent. **4**
3 Pronotum with a midlongitudinal impression (occasionally only very slightly developed). Elytral base considerably wider than pronotal base. Elytra parallel-sided. Middle and posterior male tibiae with apical tooth on inner side..... ..... ***Pseudethas***
– Pronotum without median impression. Elytral base hardly wider than pronotal base. Elytra oval. All male and female tibiae without apical tooth on inner side..... ***Herbertfranzia***
4 Base of elytra wider than base of pronotum (sometimes only slightly); interval 9 of elytra forming humeral corner. .... ***Herbertfranziella***
– Base of elytra as wide as base of pronotum; interval 9 of elytra not forming humeral corner. .. ***Nepalofranziella* n. gen.**

Genus *Herbertfranziella*

1 Dorsal part of eyes not considerably reduced, consisting of eleven facets. Aedeagus see Fig. 35. Body length 2.9–3.3 mm. – Figs. 10, 24, 35..... ***loebli* n. sp.**
– Dorsal part of eyes considerably reduced, consisting of less than eight facets. **2**
2 Humeral corners sharp. Antennomeres trapezoidal. Aedeagus see Fig. 29. Body length 2.75–2.9 mm. – Figs. 3, 18, 29..... ..... ***bhimtaleica* n. sp.**
– Humeral corners rounded. Antennomeres club-shaped..... **3**
3 Base of elytra slightly wider than pronotal base. Elytra only 2.8 times as long as pronotum. Aedeagus see Fig. 31. Body length 2.4–2.7 mm. – Figs. 5, 20, 31..... ***eutagenoides***
– Base of elytra markedly wider than pronotal base. **4**
4 Pronotum longer than wide..... **5**
– Pronotum shorter than wide..... **7**
5 Genae widest before anterior margin of eyes, then angular to clypeus. Rows of punctures on elytra coarse, punctures in rows almost confluent. Aedeagus see Fig. 28. Body length 2.7–2.8 mm. – Figs. 2, 17, 28..... ***almorensis* n. sp.**
– Genae almost parallel from posterior margin of eyes, then arched to clypeus. Punctures in rows on elytra not confluent. **6**
6 Lateral margins of pronotum slightly concave before posterior corner, anterior margin straight. Aedeagus see Fig. 30. Body length 2.5–3.05 mm. – Figs. 4, 19, 30... ***brancuccii* n. sp.**
– Lateral margins of pronotum rounded, anterior margin slightly concave at corners, convex in the middle. Aedeagus see Fig. 34. Body length 2.7–3.2 mm. – Figs. 7, 23, 34..... ..... ***kumaona***
7 Elytra almost parallel-sided in the middle third. Anterior corners of pronotum slightly protruding. Aedeagus see Fig. 33. Body length 2.25–2.85 mm. – Figs. 8, 9, 22, 33. .... ***janushevi***
– Elytra oval. Anterior corners of pronotum not protruding. Aedeagus see Fig. 32. Body length 2.4–2.9 mm. – Figs. 6, 21, 32. ..... ***himalayica* n. sp.**

Genus *Nepalofranziella*

1 Antenna (antennomeres 2–11 combined) twice as long as width of pronotum, antennomeres thick and trapezoidal, antennomeres 2–10 wider than long. Setae on elytra 3 times as long as puncture diameter, flattened and distinctly clavate

(Fig. 14.). Aedeagus length 0.64 mm (Fig. 36). Body length 2.95 mm. – Figs. 13, 14, 25, 36. ..... ***kaszabi* n. sp.**

– Antenna (antennomeres 2–11 combined) 3 times as long as width of pronotal base, antennomeres elongate trapezoidal, antennomeres 3–11 longer than wide. Setae on elytra twice as long as puncture diameter, erect, but only slightly clavate on apical declivity (Fig. 15) Aedeagus length 1.15 mm (Fig. 37.). Body length 3.4 mm. – Figs. 12, 15, 16, 26, 37). .... ***schawalleri* n. sp.**

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Odontoedon, a new genus from China with descriptions of nine new species (Coleoptera: Chrysomelidae: Chrysomelinae)

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Abstract

Odontoedon **n. gen.**, a new chrysomelid genus from China, and nine new species, *O. globosus* **n. sp.**, *O. kippenbergi* **n. sp.**, *O. lopatini* **n. sp.**, *O. impressus* **n. sp.**, *O. rufulus* **n. sp.**, *O. sericeus* **n. sp.**, *O. sichuanus* **n. sp.**, *O. taiwanus* **n. sp.**, and *O. thibetanus* **n. sp.** are described and illustrated. *Phaedon chinensis* Gressitt & Kimoto, *P. fulvescens* Weise, *P. limbatus* Lopatin, *P. maculicollis* Chen, and *P. potentillae* Wang are transferred to *Odontoedon*. *Phaedon cupreus* Wang and *P. fulgidus* Ge & Wang are new synonyms of *Odontoedon chinensis* (Gressitt & Kimoto). A key to the species of *Odontoedon* is presented.

Keywords: Chrysomelidae, Chrysomelinae, new genus, new species, China.

Zusammenfassung

Odontoedon **n. gen.**, eine neue Chrysomeliden-Gattung aus China wird zusammen mit neun neuen Arten beschrieben: *O. globosus* **n. sp.**, *O. kippenbergi* **n. sp.**, *O. lopatini* **n. sp.**, *O. impressus* **n. sp.**, *O. rufulus* **n. sp.**, *O. sericeus* **n. sp.**, *O. sichuanus* **n. sp.**, *O. taiwanus* **n. sp.** und *O. thibetanus* **n. sp.** *Phaedon chinensis* Gressitt & Kimoto, *P. fulvescens* Weise, *P. limbatus* Lopatin, *P. maculicollis* Chen und *P. potentillae* Wang werden zu *Odontoedon* gestellt. *Phaedon cupreus* Wang und *P. fulgidus* Ge & Wang sind neue Synonyme von *Odontoedon chinensis* (Gressitt & Kimoto). Ein Schlüssel für die Arten von *Odontoedon* wird erstellt.

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1 Introduction

A new Chrysomelinae genus, *Odontoedon* n. gen., and nine new species, *O. globosus* n. sp., *O. kippenbergi* n. sp., *O. lopatini* n. sp., *O. impressus* n. sp., *O. rufulus* n. sp., *O. sericeus* n. sp., *O. sichuanus* n. sp., *O. taiwanus* n. sp., and *O. thibetanus* n. sp. from China are described and illustrated. The new genus differs from *Yunnaedon* Daccordi & Medevdev, 2000 in the bilobed tarsomere III and the pronotum without longitudinal depressions laterally. Five species, *O. chinensis* (Gressitt & Kimoto, 1963), *O. fulvescens* (Weise, 1922), *O. limbatus* (Lopatin, 2002), *O. maculicollis* (Chen, 1974), and *O. potentillae* (Wang, 1992) were treated under *Phaedon* Latreille, 1829 before our study, but all of them share the characters typical for the new genus *Odontoedon* (onychium enlarged apically with two short teeth, the third segment of the tarsi bilobed, and the claws simple). Type species of *Odontoedon* n. gen. is *Phaedon fulvescens*.

Odontoedon n. gen. is endemic to China, most of the included species occur in the southwestern part of this country. The biology of the new genus is still insufficiently studied. Host plant records are known only from two species: *Rubus* sp. for *O. fulvescens*, and *Potentilla* sp. for *O. potentillae*.

Acknowledgements

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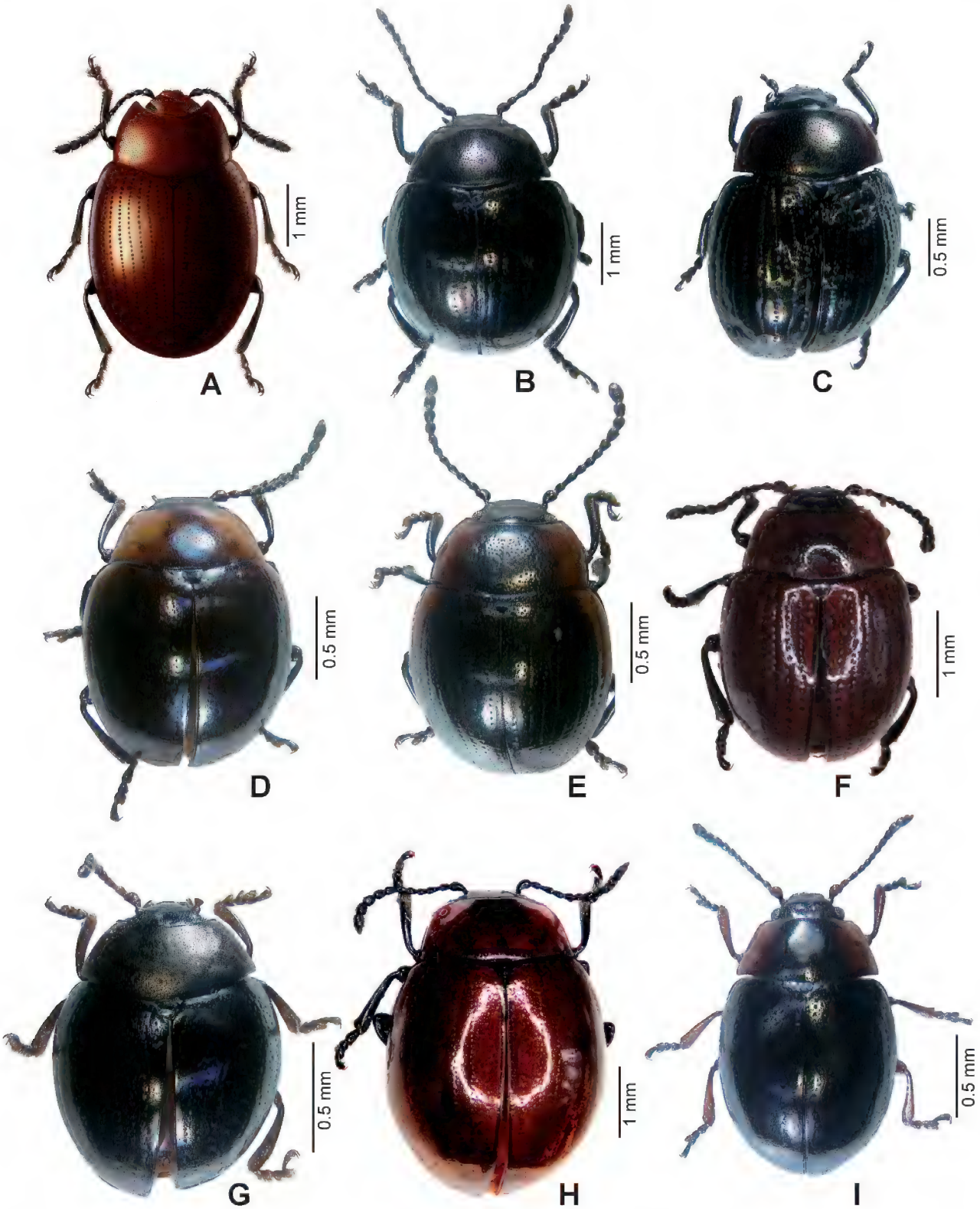

Fig. 1. Habitus, dorsal view. – **A**. *Odontoedon* fulvescens (Weise). **B**. *O. chinensis* (Gressitt & Kimoto). **C**. *O. impressus* n. sp. **D**. *O. kippenbergi* n. sp. **E**. *O. lopatini* n. sp. **F**. *O. rufulus* n. sp. **G**. *O. sericeus* n. sp. **H**. *O. taiwanus* n. sp. **I**. *O. thibetanus* n. sp.

(Special Subjects in Animal Taxonomy, NSFC-J0630964/J0109, J0930004).

2 Materials and Methods

The present study includes all known species of the new genus occurring in China. It is based on the examination of own-collected material, loans from museums and private collections, and several gifts from individual collectors.

Acronyms of depositories

APC	Andreas Pütz's collection, Eisenhüttenstadt, Germany
CAS	California Academy of Sciences, San Francisco, California, USA
CNC	Canadian National Collection of Insects, Ottawa, Ontario, Canada
IZAS	Institute of Zoology, Chinese Academy of Sciences, Beijing, China
HKC	Horst Kippenberg's collection, Herzogenaurach, Germany
MDC	Mauro Daccordi's collection, Verona, Italy
MNHN	Muséum National d'Histoire Naturelle, Paris, France
NMEG	Naturkundemuseum Erfurt, Germany
ZIN	Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
ZSM	Zoologische Staatssammlung, Munich, Germany

Adults were placed and dissected in pure alcohol. Some specimens were digested with 10% solution of potassium hydroxide for the study of head, mouthparts and internal skeleton. All of the materials, including adults, were treated with ultrasonic vibrations before being observed under the SEM, adult samples were fixed by dehydration in different percentages of alcohol followed by air drying and gold-sputter coating; then photographed with XL20 ESEM-TMP. In the SEM microscope, we photographed the frontal, lateral and dorsal views of the head of the larvae, and close-ups of the anterior view of the mouthparts and legs. Drawings of the skeleton were made with a camera lucida on a Leica MZ 125. For the female genitalia a Zeiss Axioplan microscope and Delta-Pix software was used. All pictures were evaluated and assembled with Adobe Photoshop CS 3 and Illustrator CS 3 software.

The following standards are used for the description of characters: Puncture density is defined as dense if punctures are nearly confluent to less than two puncture diameters apart, moderately dense if punctures are between two to six puncture diameters apart, and sparse if punctures are separated by more than six puncture diameters. Puncture size is defined as small if 0.02 mm or smaller, moderate if between 0.02 and 0.06 mm, and large if 0.06 mm or larger. Coloration is described based on specimens viewed under magnification and with artificial illumination. Body length is measured from the apex of the clypeus to the apex of the elytra. The body width is measured at the broadest part of the elytra. Length of pronotum is the average length at the middle. Width of pronotum is the average width at the middle. Suture length is measured from the base of the elytral suture to apex. Width of elytra is measured at the middle.

The terms mesoventrite and metaventrite are used according to Beutel & Haas (2000) and Lawrence et al. (2010).

3 Taxonomy

3.1 Description of *Odontoedon* Ge & Daccordi, **n. gen.**

Type species: *Phaedon fulvescens* Weise, 1922.

Etymology

From ancient Greek, odonto = tooth. The genus name is the combination of Odonto and *Phaedon* which is a genus of Chrysomelinae.

Description

Habitus: Body sub-spherical, strongly convex (Fig. 1).

Head: Small, deeply inserted into prothorax (Fig. 1); clypeus with coarse punctures and pubescent; frons slightly depressed, flattened along antennal sockets; upper clypeus (lower frons) between antennal sockets with sub-triangular carina; frons slightly depressed, flattened along antennal sockets; compound eyes elongate or sub-spherical. Anterior part of labrum emarginate (Fig. 2D). Apical segment of maxillary palpi slender and pointed, twice as long as penultimate segment (Fig. 2E). Antennae extending well beyond base of elytra, antennomeres 7–11 broadened apically (Figs. 1D, 1E).

Pronotum: Anterior margin broadly emarginate with projecting anterior angles (Figs. 5E, 5K); much narrower at base than elytra; lateral margins evenly, gradually rounded, slightly narrower at antero-lateral angles; posterior angles obtuse; anterior, lateral and posterior borders marginate.

Scutellum: Triangular with rounded apex, impunctate.

Elytra: Broader than pronotum at base, slightly broadened posterior to the middle (Fig. 1); with ten striae, not including incomplete basal scutellar row (Figs. 7D–F); humeral callus not prominent; interspace tapered and narrow apically; interspaces equally spaced except the 8th which is wider; epipleuron flat, broadened basally, slightly narrowed posteriorly, inner edge without pubescence (Fig. 2A).

Underside: Prosternal process slender or wide, truncate apically, slightly broadened (Figs. 2B, 2C); procoxal cavities open behind (Fig. 2B); process of mesoventrite broadened, emarginate apically (Fig. 3A); antero-lateral plate of metaventrite small or large, without punctures (Figs. 2A, 3A).

Legs: Femora robust (Figs. 3C, 3D); tibiae slender, lateral margin of tibiae curved, with dense pubescence especially at apex (Fig. 3C); third segment of tarsi bilobed (Fig. 3B); onychium enlarged apically with two short teeth (Fig. 4B), claws simple (Fig. 4B).

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically (Fig. 6D); in lateral view bent at right angles (Fig. 6E); internal sac invisible at posterior border of basal foramen; flagellum invisible.

Spermatheca: Falciform or C-shaped, with or without long convoluted duct, with or without bulbiform structure (Figs. 6G, 16F).

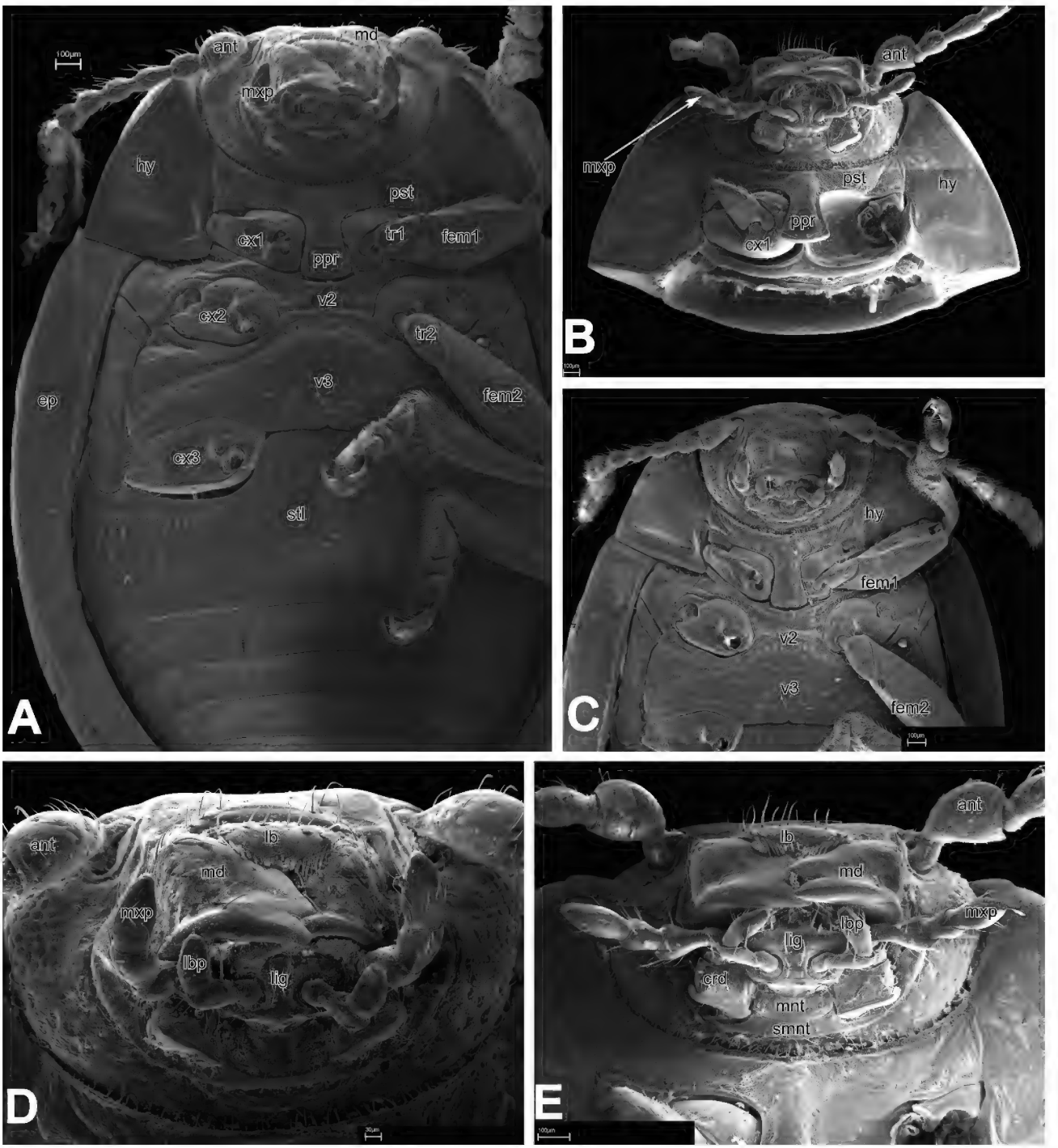

Fig. 2. *Odontoedon chinensis* (Gressitt & Kimoto), SEM. – **A**. Ventral side of body. **B**. Ventral side of head and prosternum. **C**. Ventral side of head and thorax. **D**. Head, frontal view. **E**. Head, ventral view, showing mouthpart. – Abbreviations: ant = antenna; crd = cardo; cx1 = procoxal cavity; cx2 = mesocoxal cavity; cx3 = metacoxal cavity; ep = epipheuron; fem1 = profemora; fem2 = metafemora; hy = hypemeron; lb = labrum; lbp = labial papli; lig = ligular; md = mandible; mnt = mentum; mxp = maxillary palpi; ppr = prosternal process; pst = prosterum; smnt = submentum; stI = first segment of abdominal sternite; tr1 = pro-trochantin; tr2 = meso-trochantin; v2 = mesoventrite; v3 = metaventrite.

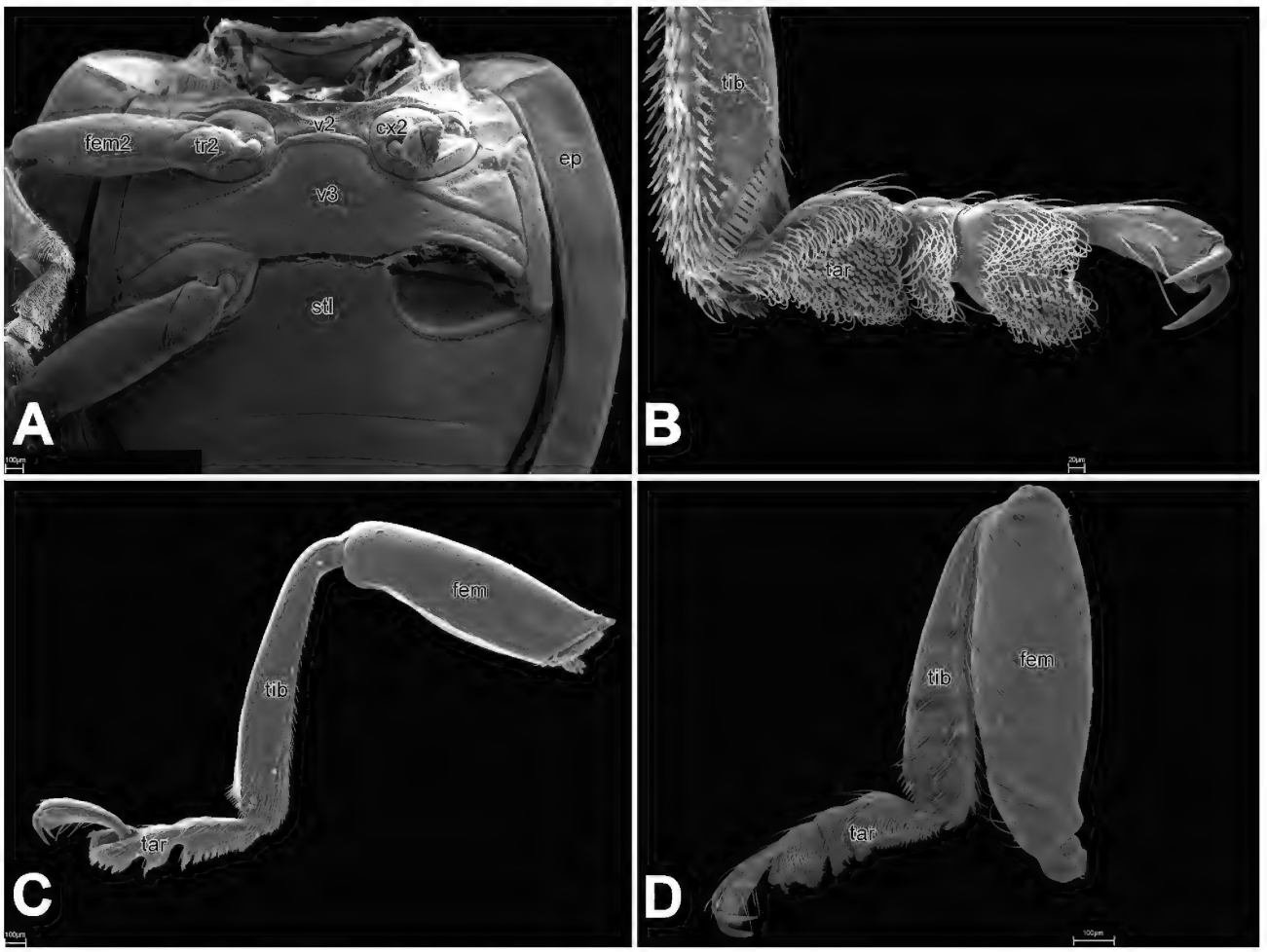

Fig. 3. *Odontoedon chinensis* (Gressitt & Kimoto), SEM. – **A**. Thorax, ventral view. **B**. Tibia and tarsi, lateral view. **C**. Proleg. **D**. Hindleg. – Abbreviations: cx2 = mesocoxal cavity; ep = epipheuron; fem2 = metafemora; stI = first segment of abdominal sternite; Tar = tarsus; Tib = tibia; tr2 = meso-trochantin; v2 = mesoventrite; v3 = metaventrite.

Differential diagnosis

The genus *Odontoedon* is similar to *Yunnaedon* Daccordi & Medevdev, but it can be distinguished by the bilobed tarsomere III and the pronotum without longitudinal depressions laterally.

Distribution

China: Anhui, Hubei, Hunan, Zhejiang, Jiangxi, Taiwan, Guangdong, Guangxi, Guizhou, Sichuan, Yunnan; Vietnam; Laos.

3.2 Descriptions and redescriptions of species of *Odontoedon* n. gen.

Odontoedon chinensis (Gressitt & Kimoto, 1963), **n. comb.**
(Figs. 1B, 2, 3, 5A, 6)

Phaedon chinensis Gressitt & Kimoto, 1963: 335.
Phaedon cupreum Wang, 1992b: 176, 177, **n. syn.**
Phaedon fulgidus Ge & Wang [in Ge, Yang & Cui], 2004: 77, **n. syn.**

Material examined

Phaedon chinensis Gressitt & Kimoto: Holotype: ♀, "China: Sui-sa-pa, 1000 m, Lichuan Distr., W. Hupeh, China, VII-31, 48 / Gressitt & Djou Collrs. / Holotype, female, *Phaedon chinensis* Gressitt & Kimoto / *Phaedon* sp. nov., det. S. Kimoto, '51 / California Academy of Sciences, Type no. 13296" (CAS).

Phaedon cupreum Wang: Holotype: ♀, "China: Hunan, Sanzhi, Tianping Shan, 1570 m, 12 August 1988, leg. Shu-Yong Wang" (IZAS).

Phaedon fulgidus Ge & Wang: Holotype: ♂, "China, Guizhou Province, Huixiangping County, Fanjing Shan (27.9°N, 108.6°E), 1780 m, 1 August 2001, Coll. Hongbin Liang". – Paratypes: 2 ♀♀, same data as holotype, except collected by Kangzhen Dong (all IZAS).

Other material: China: Aihui, Huangshan, Yungu Temple, 1000 m, 22.VIII.1978, 2 ♀♀, leg. Shu-Yong Wang. – Hubei,

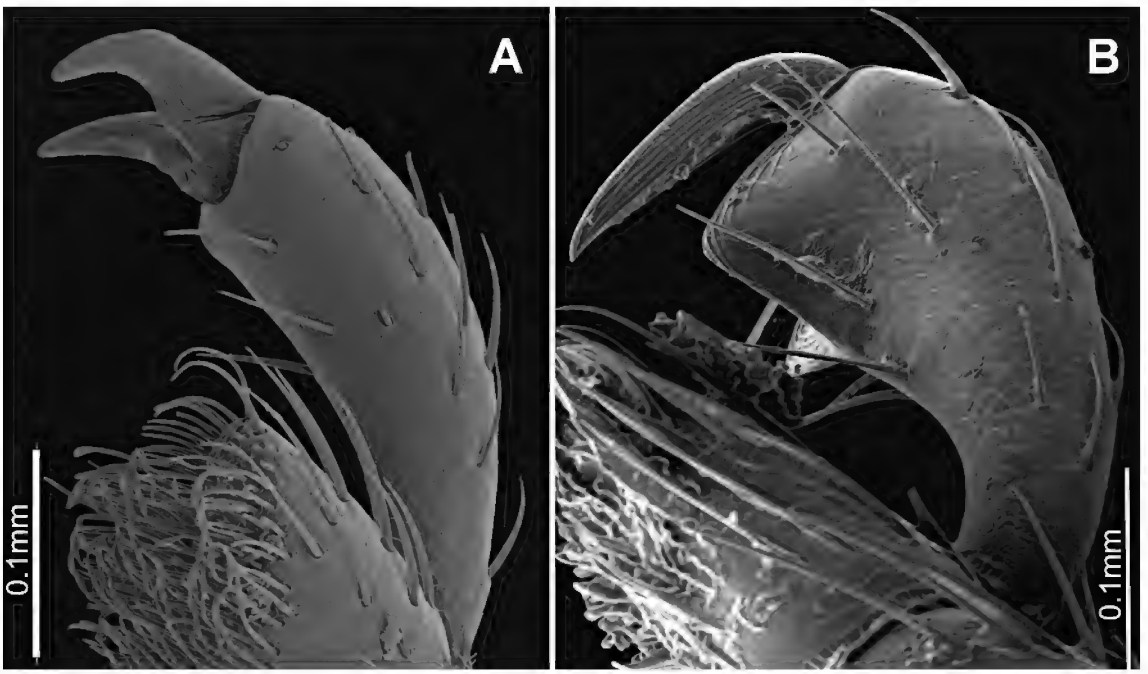

Fig. 4. *Phaedon* and *Odontoedon* spp., onychium, lateral view, SEM. – **A**. *Phaedon alticola* Wang. **B**. *Odontoedon fulvescens* (Weise).

Shennongjia, Badongya, 2700 m, 23.VII.1980, 1 ♀, leg. Pei-Yu Yu; Sahu Linchang, 1640 m, 22.VII.1980, 1 ♂, leg. Pei-Yu Yu. – Sichuan, Wushan, Liziping, 1800 m, 18.V.1994, 1 ♂, leg. You-Wei Zhang; 1850 m, 8.VII.1993, 1 ♀, leg. Xing-Ke Yang (all IZAS).

Redescription

Measurements: Body length 3.6–4.6 mm, body width 2.6–3.2 mm.

Habitus: Body sub-spherical, strongly convex (Fig. 1B).

Coloration: Metallic bronze, pitch-dark; clypeus, last segment of maxillary palpi, two apical segments of labial palpi and claws reddish brown.

Head: Frons with coarse, sparse punctures; vertex finely shagreened, with very fine, sparse, confused punctures. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 6A, 6B.

Pronotum (Fig. 1B): Average length at middle 1.2 mm, average width at middle 1.6 mm; disc with sparse punctures, diameter of punctures same as those of clypeus (Fig. 5A); lateral and anterior angles with coarse punctures; posterior margin with coarse and dense punctures; surface shagreened.

Scutellum: Ligulate, smooth and impunctate, surface slightly shagreened.

Elytra: Length 2.7 mm, width at middle 3.2 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, same as those of the pronotum, ninth stria with very sparse punctures (Fig. 6C); interspace surface smooth, impunctate, finely shagreened.

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically truncate, slightly broadened, central area with a longitudinal ridge; process of mesoventrite with sparse punctures and pubescence; metaventrite with large, coarse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 6D–6F).

Spermatheca: Falciform, with long convoluted duct and bulbiform structure (Fig. 6G).

Differential diagnosis

After studying the type specimens of the three taxa *Odontoedon chinensis* (Gressitt & Kimoto), *O. fulgidus* (Ge & Wang), and *O. cupreus* (Wang), we found that they are quite similar, particularly in the shape of the aedeagus (Figs. 6D, 6F). *O. chinensis* has slightly finer and denser punctures than *O. fulgidus* and *O. cupreus* (Fig. 7), but we believe that this small difference does not justify a separation on species level, so we treat the latter two names as new synonyms of *O. chinensis*.

Distribution

China: Anhui, Hubei, Hunan.

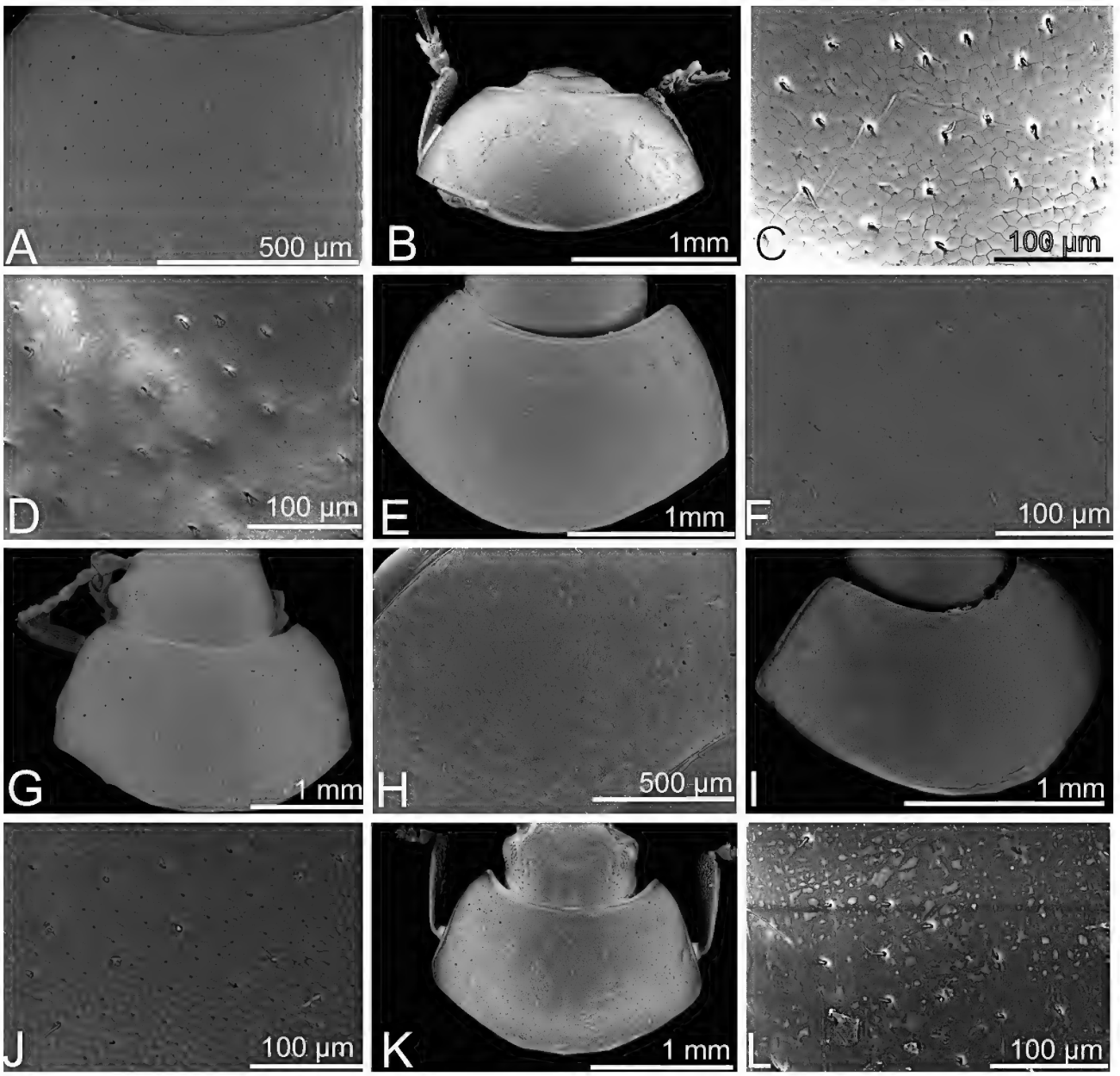

Fig. 5. *Odontoedon* spp., SEM, showing head and pronotum, and punctures of pronotum. – **A**. *O. chinensis* (Gressitt & Kimoto), punctures of pronotum. **B**. *O. globosus* n. sp., head and pronotum, dorsal view. **C**. *O. globosus* n. sp., punctures of pronotum. **D**. *O. kippenbergi* n. sp., punctures of pronotum. **E**. *O. lopatini* n. sp., pronotum, dorsal view. **F**. *O. lopatini* n. sp., punctures of pronotum. **G**. *O. potentillae* (Wang), pronotum, dorsal view. **H**. *O. potentillae* (Wang), punctures of pronotum. **I**. *O. sericeus* n. sp., pronotum, dorsal view. **J**. *O. sericeus* n. sp., punctures of pronotum. **K**. *O. thibetanus* n. sp., pronotum, dorsal view. **L**. *O. thibetanus* n. sp., punctures of pronotum.

Odontoedon fulvescens (Weise, 1922), **n. comb.**
(Figs. 1A, 4B, 8)

Phaedon fulvescens Weise, 1922: 55.

Material examined

Older material: "Tonkin, Montes Mauson, April Mai, 2–3000', H. Fruhstorfer / *Phaedon fulvescens* Weise", 1 ♀, 1 ♂ (ZSM). – "Tonkin, Montes Mauson, April Mai 2–3000', H. Fruhstorfer, Museum Paris, Coll. H. Clavareau, 1932", 1 ♂ (MNHN). – "Tonkin, Montes Mauson, April–Mai, 2–3000', H. Fruhstorfer" 2 ♂♂, 2 ♀♀ (MDC). – "Museum Paris, Honai, Coll. L. Bedel, 1922", 1 ♂ (MNHN). – "Museum Paris, Tokin, Dong-Van & Laokey (Vitalis de Salvaza), Mme, A. Vuillet, 1920", 1 ♂ (MNHN). – "Tonkin, Tan-moi, Juni–Juli, H. Fruhstorfer", 1 ♂ (MNHN). – "Museum Paris, Tonkin, Vinyen, Tamduo, Coll. A. Bonhoure,

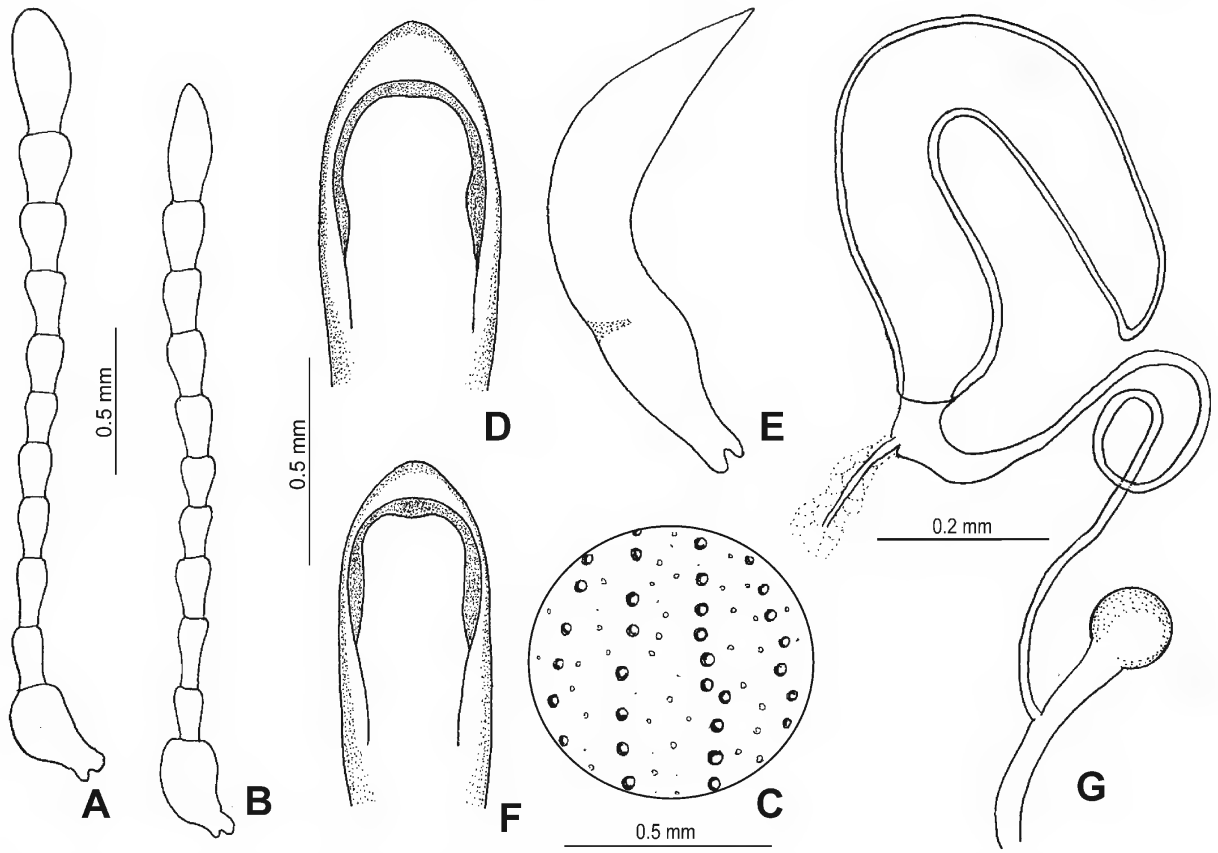

Fig. 6. *Odontoedon chinensis* (Gressitt & Kimoto) (A–E, G), *O. cupreus* (Wang) (F). – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Aedeagus, dorsal view. **G**. Spermatheca.

1909, Juni", 1 ♀ (MNHN). – "Museum Paris, Tonkin, Vinh Yen, Tamdao, Coll. A. Bonhoure, 1909, Juin", 1 ♀ (MNHN). – "Museum Paris, Kouy-Tchéou, Gal Chouen, Hiny fou ey Tchen-Fong, Tchéou, P. Cavalerie, 1912 / Juin", 1 ♂ (MNHN).

Recent material: Zhejiang: Zhoushan, Dinghai, 24.IV.1991, 1 ♂, 1 ♀, collector unknown (IZAS). – Jiangxi: Longnan, Niulian Mts., 21.VI.1975, 1 ♀, leg. Shi-Mei Song (IZAS). – Hunan: Yizhang, 30.VI.1974, 1 ♂, leg. Shu-Yong Wang (IZAS). – Guangxi: Guilin, Yanshan, 200 m, 16.V.1963, 2 ♂♂, 2 ♀♀, leg. Shu-Yong Wang (IZAS); Longzhou, Daqingshan Mts., 360 m, 27.IV.1963, 1 ♂, 3 ♀♀, leg. Yong-Shan Shi, Shu-Yong Wang (IZAS); Yaoshan Mts., V.1938, 1 ♂, 1 ♀, collector unknown (IZAS). – Guizhou: Libo, Maolan, 500–800 m, 25.X.1998, 1 ♂, 1 ♀, leg. Xing-Ke Yang and Wen-Zhu Li (IZAS). – Yunnan: Pinbian, Daweishan Mts., 1500 m, 17.VI.1956, 1 ♂, leg. Ke-Ren Huang (IZAS); Jinping, Hetouzhai, 1700 m, 13.V.1956, 1 ♂, leg. Ke-Ren Huang (IZAS). – N. Vietnam, Tam-Dao, 17.IX.1980, 1000 m, 1 ♂, leg. F. Heike (MDC). – Laos-CE, Boli Kham Xai prov. Ban Nape (8 km NE), 600 m, 18°21'N, 105°08'E, 1.–18.V.2001, 1 ♂, leg. Pacholátko (MDC).

Redescription

Measurements: Body length 5.0–6.2 mm, body width 3.0–4.1 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1A).

Coloration: Yellowish brown; antennae, legs, mesoventrite, metaventrite and first segment of abdomen dark brown; antennomeres I and II paler than remaining segments.

Head: Frons with dense, moderate punctures; vertex with moderate confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 8A, 8B.

Pronotum: Average length at middle 1.3 mm, average width at middle 1.6 mm; disc with moderate and dense punctures, diameter of punctures same as those of frons; with finer punctures interspersed; laterally with slightly sparser punctures; posterior margin with denser and larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.7 mm, width at middle 3.3 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with small and sparse punctures (Fig. 8C).

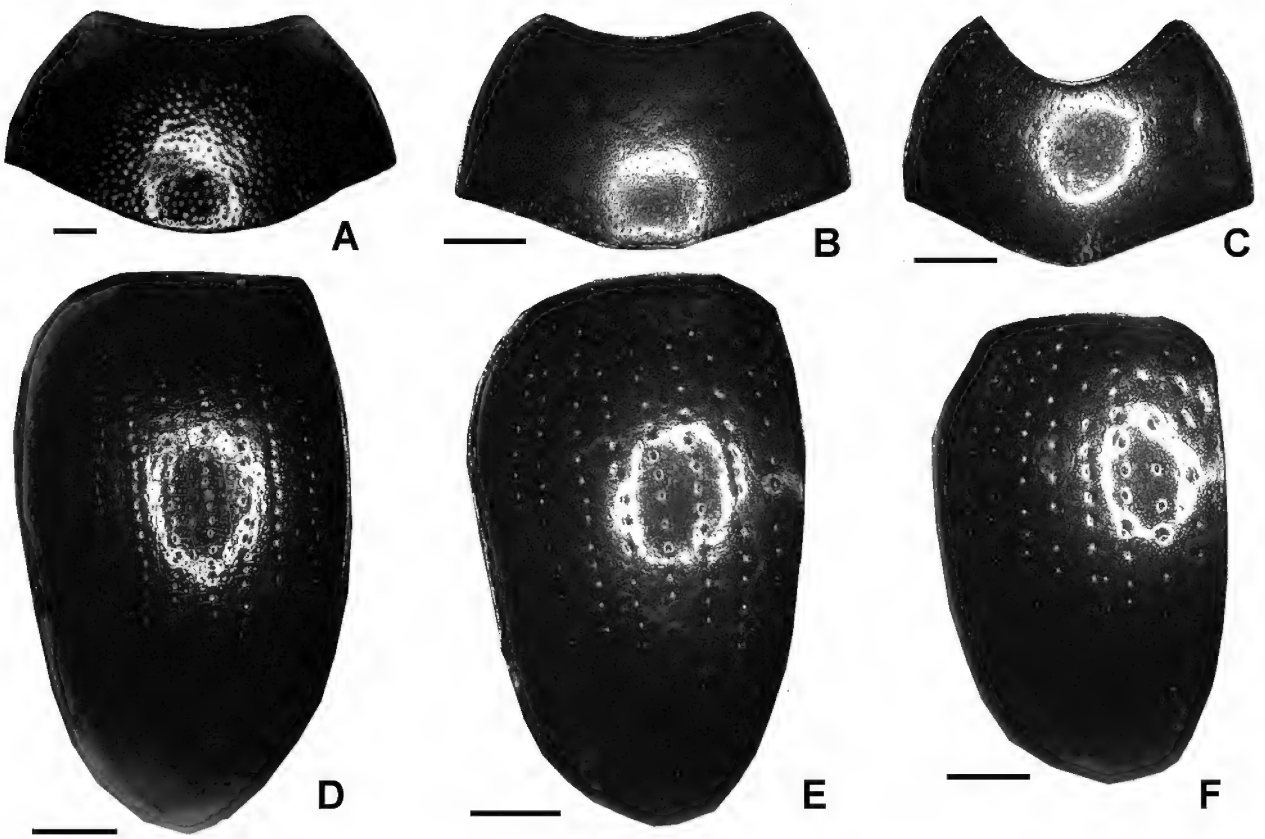

Fig. 7. *Odontoedon* spp., pronotum (A–C) and elytra (D–E). – **A**. *O. chinensis* (Gressitt & Kimoto). **B**. *O. cupreus* (Wang). **C**. *O. fulgidus* (Ge & Wang). **D**. *O. chinensis* (Gressitt & Kimoto). **E**. *O. cupreus* (Wang). **F**. *O. fulgidus* (Ge & Wang). – Scales: 1 mm.

Hind wings: Present.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically rounded, slightly broadened, central area with a longitudinal ridge; mesoventrite with sparse punctures and pubescence; metaventrite with large and sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 8D, 8E).

Spermatheca: Falciform, with long convoluted duct and bulbiform structure (Fig. 8F).

Differential diagnosis

Odontoedon fulvescens is similar to *O. chinensis* Gressitt & Kimoto, but differs from it primarily in the punctation of the pronotum and the morphology of the aedeagus. *P. chinensis* differs from *O. fulvescens* by the following characters: vertex with dense and fine punctures; pronotum with coarse and dense punctures; scutellum sub-triangular, with fine punctures; diameter of punctures of elytral striae the same as those of pronotum, interstriae with fine punctures.

Distribution

China: Zhejiang, Jiangxi, Hunan, Taiwan, Guangdong, Guangxi, Guizhou, Yunnan; Vietnam; Laos.

Host plant

Only *Rubus* sp. is known as host plant.

Odontoedon globosus Daccordi & Ge, **n. sp.**
(Figs. 5B, 5C, 9)

Holotype (♂): "Ch. S. Gansu, SSW Minxian Du Shan, SE of Chulong, ~34.13N/103.53E / 2700–3000 m, forest, SW Slope, 3–4.VII.2002, Belousov & Kabak" (ZIN).

Etymology

From Latin, globosus = spherical, because the body shape of the new species is spherical.

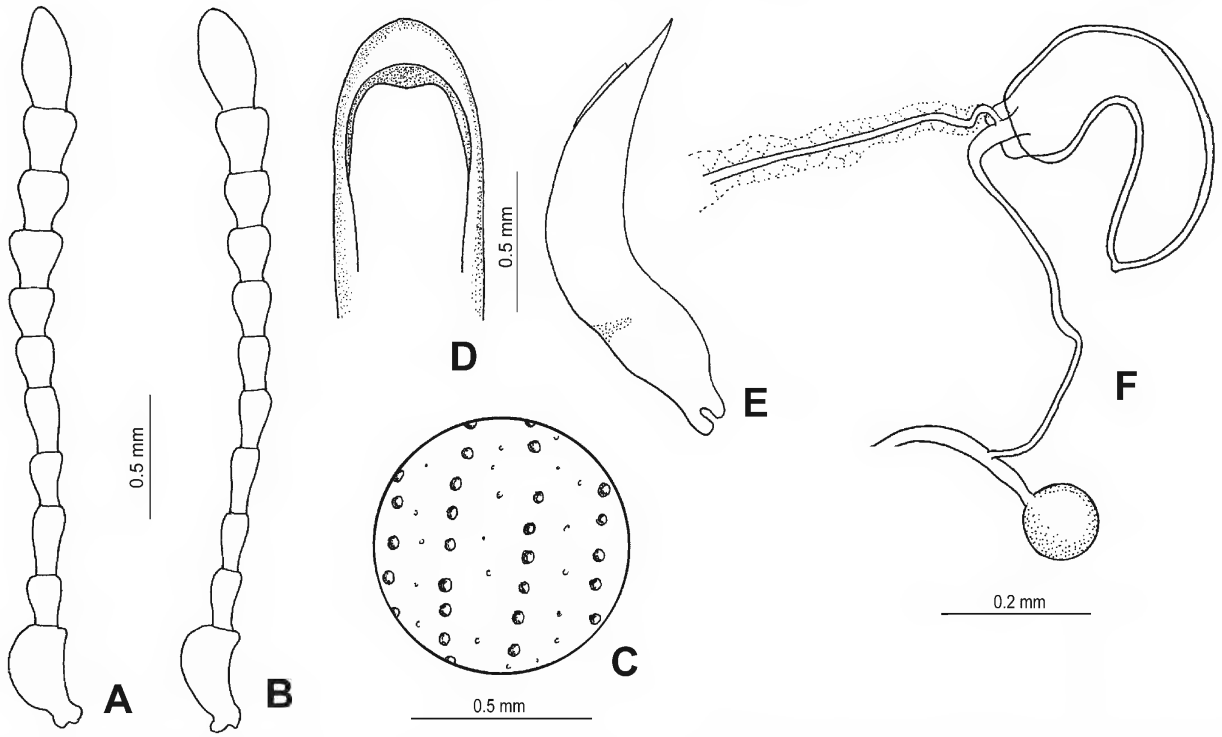

Fig. 8. *Odontoedon fulvescens* (Weise). – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

Description

Measurements: Body length 2.8 mm, body width 2.33 mm.

Habitus: Very small, sub-spherical, strongly convex.

Coloration: Black, only lateral sides of pronotum dark red.

Head: Frons slightly depressed, with sparse, small punctures; vertex shagreened, with moderate, dense, confused punctures; eyes elliptical. – Antennae: Only basal five segments present, other segments missing (Fig. 9A).

Pronotum (Figs. 5B, 9E): Average length at middle 0.87 mm, average width at middle 1.74 mm; disc with moderate and dense punctures, diameter of punctures same as those of vertex; with finer punctures densely interspersed (Fig. 5C); laterally with much sparser punctures (Fig. 9E).

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.4 mm, width at middle 1.5 mm; abbreviated scutellar stria plus 10 complete striae composed of deep, dense and very large punctures, 3 times as large as

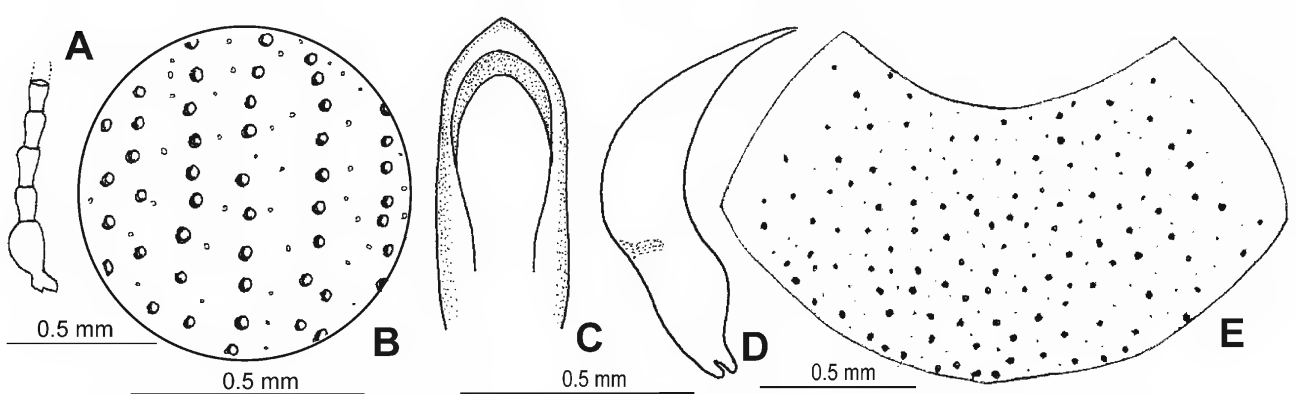

Fig. 9. *Odontoedon globosus* n. sp. – **A**. Antenna, ♂. **B**. Elytral punctures (schematic). **C**. Aedeagus, dorsal view. **D**. Aedeagus, lateral view. **E**. Pronotum, dorsal view.

those of pronotum, ninth stria with very sparse punctures; interspace surface with fine and sparse punctures (Fig. 9B).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically rounded, slightly broadened, central area with a longitudinal ridge; process of mesoventrite narrow, posterior margin emarginate; metaventrite with large and sparse punctures, similar to those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 9C, 9D).

Spermatheca: Unknown.

Differential diagnosis

The new species differs from all other species of the genus *Odontoedon* in its very small body length and the entirely black colour.

Remarks

M. Daccordi received the type specimen of the new species from Prof. Igor Lopatin in the beginning of 2011. The original name written by Lopatin on the label was "*Phaedon globosus* Lopatin, n. sp.". After examination in detail, M. Daccordi and S.-Q. Ge regarded this new species as belonging to *Odontoedon*, and asked Lopatin if he agrees that the species will be described in a new genus. After we received his positive answer, we decided to publish the description together, but, unfortunately, Lopatin passed away recently. We used Lopatin's species name *globosus* to respect his opinion.

Distribution

China: Sichuan.

Odontoedon impressus Daccordi & Yang, **n. sp.** (Figs. 1C, 10)

Holotype (♀): "China-S Sichuan, 2600–2700 m, pass between Wupo-Jinyang *Corylus-Rhododend.-Quercus* shrubs, 15.–21.VI.2004, leg. R. Fabbri" (IZAS).

Paratype: 1 ♀, same data as holotype (MDC).

Etymology

From Latin, impress = strong; *impressus* means the strong punctures on the elytra.

Description

Measurements: Body length 5.1 mm, body width 3.8 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1C).

Coloration: Head, underside of body, antennae, and legs dark; pronotum reddish brown; central disc of pronotum with a large black marking which covers more than half of the pronotum.

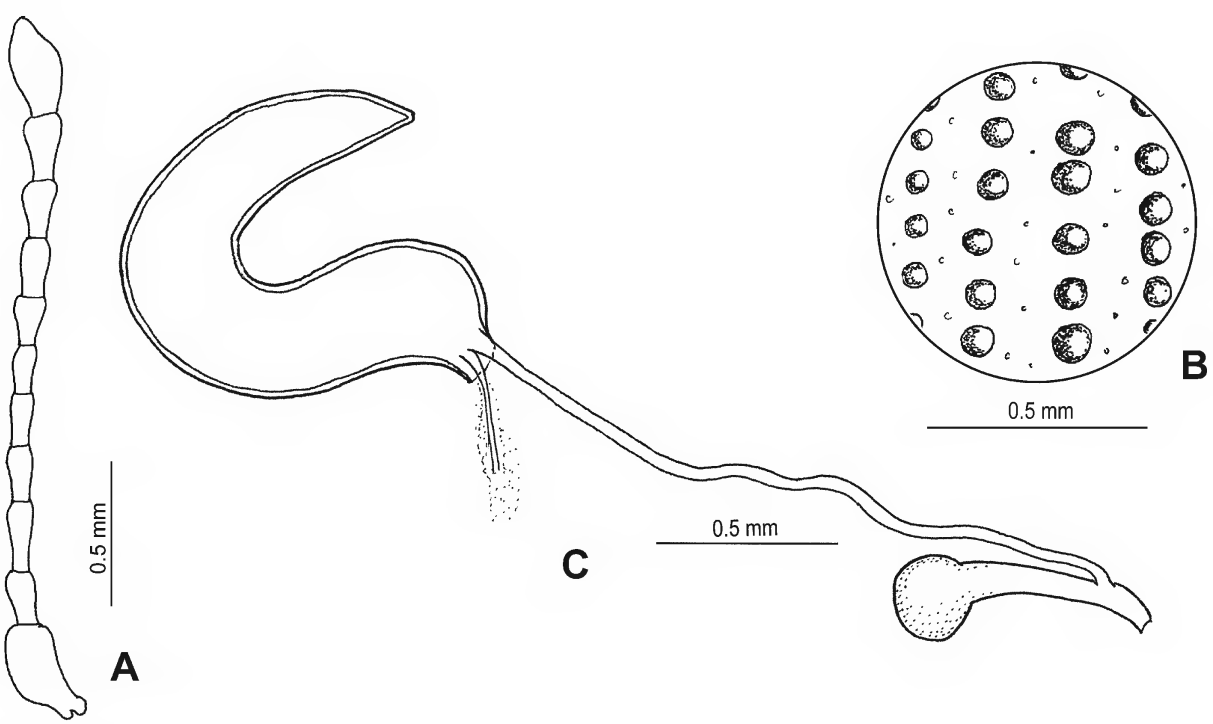

Fig. 10. *Odontoedon impressus* n. sp. – **A**. Antenna, ♀. **B**. Elytral punctures (schematic). **C**. Spermatheca.

Head: Frons with dense, small punctures; vertex with moderate confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments see Fig. 10A.

Pronotum: Average length at middle 2.7 mm, average width at middle 1.4 mm; disc with fine and dense punctures, diameter of the punctures the same as or larger than those of frons, finer punctures densely interspersed; laterally with much sparser punctures; posterior margin with denser and larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.8 mm, width at middle 2.6 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of very deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface convex, with fine and sparse punctures (Fig. 10B).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence; process of mesoventrite with sparse punctures and pubescence; metaventrite with large and sparse punctures, similar to those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: unknown.

Spermatheca: Falciform, with long convoluted duct and bulbiform structure (Fig. 10C).

Differential diagnosis

The new species, near to *O. chinensis*, can be recognized by its very strong and depressed elytral striae.

Distribution

China: Sichuan.

Odontoedon kippenbergi Daccordi & Ge, **n. sp.**
(Figs. 1D, 5D, 11)

Holotype (♂): "China: W.Sichuan, Ya'an Prefecture, Tianquan, Co., E. Erlang Shan Pass / 2900 m, 20.VI.1999, 29°52'36"N, 102°17'82"E, leg. A. Pütz / Sammlung Andreas Pütz, Eisenhüttenstadt" (IZAS).

Paratypes: 1 ♀, same data as holotype (MDC). – 1 ♂, "China [W. Sichuan] Erlang Shan E Sautao Kiao Pass, 3000 m, 29°52'N, 102°17'E, 19.V.1997, Wrase / coll. U. Arnold (Jan. 2000)" (HKC). – 1 ♀, "Ch., C-Sichuan (Tianguan), pass betw. Tianguan-Luding, 29°51'73"N, 102°16'85"E, 3000 m, 22.7.2000, lgt. M. Janata" (IZAS). – 1 ♀, "China: Sichuan env. Maoxian, h = 4150 m, 30.VII.2000, leg. S. Murzin" (MDC).

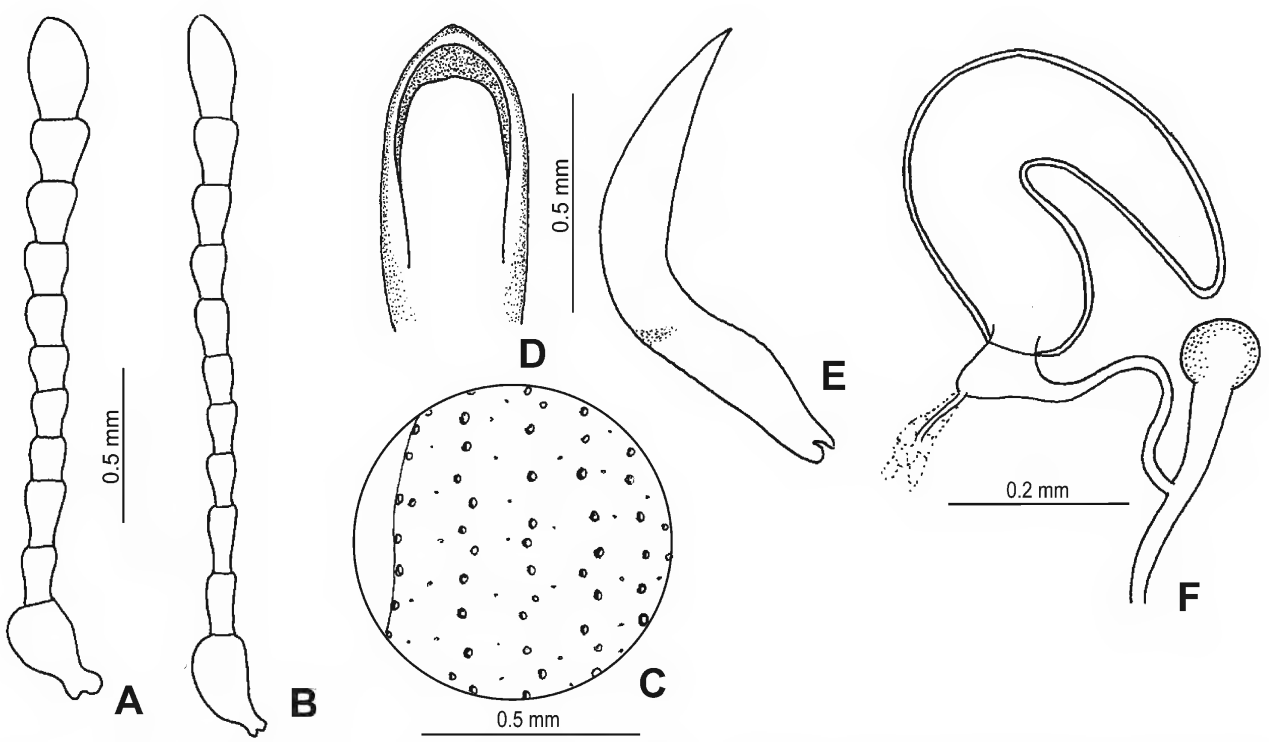

Fig. 11. *Odontoedon kippenbergi* n. sp. – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

Etymology

Named after the well-known German Chrysomelidae taxonomist Dr. Horst Kippenberg (Herzogenaurach).

Description

Measurements: Body length 3.50–4.25 mm, body width 2.25–2.50 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1D).

Coloration: Head dark; antennae, mouthparts, legs, mesoventrite, metaventrite, first segment of abdomen, and elytra dark brown; pronotum and lateral margin of elytra reddish brown; central disc of pronotum usually with dark longitudinal markings (a trapezoidal macula over the entire length, a triangular macula near anterior margin, or a subtriangular macula near posterior margin), sometimes macula absent.

Head: Frons with dense, small punctures; vertex with small confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 11A, 11B.

Pronotum: Average length at middle 1.0 mm, average width at middle 1.75 mm; lateral margins evenly, slightly narrower at anterior angles, with a line of punctures along lateral margins; disc with moderate punctures, diameter of punctures same as those of frons; with very fine punctures interspersed (Fig. 5D); laterally with slightly sparser punctures; posterior margin with denser and larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.75 mm, width at middle 2.9 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of shallow, moderate punctures, same as those of pronotum, ninth stria with very sparse punctures; interspace surface with small and sparse punctures (Fig. 11C).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically rounded, slightly broadened, central area with a longitudinal ridge; with sparse punctures and pubescence; metaventrite with large and sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 11D, 11E).

Spermatheca: Falciform, with long convoluted duct and bulbiform structure (Fig. 11F).

Differential diagnosis

The new species is similar to *O. lopatini*, but it can be distinguished by the following characters: pronotum totally red or with a very little dark shade, punctures of elytra striae small and relative sparse.

Distribution

China: Sichuan.

Odontoedon limbatus (Lopatin, 2002), **n. comb.** (Fig. 12)

Phaedon limbatus Lopatin, 2002: 115.

Material examined

Holotype: ♂, "CH. Sichuan, SSW of Shimian, E. Slope of Mt. 4977, W of Lijipin, 3000–4200 m, 5.07.2000, Belousov, Kabak, Davidian" (ZIN).

Other material: 1♂, "China, W. Sichuan, West of Zhier (Zi'er) 2866 m; N 28°22,293'; E 101°32,701' R. Sehnal & M. Tryzna" (MDC).

Redescription

Measurements: Body length 3.47 mm, body width 2.33 mm.

Habitus: Body sub-spherical, convex dorsally.

Coloration: Head, antennae, mouthparts, legs, and underside of body dark; pronotum and lateral margin of elytra reddish brown, central disc of pronotum with a large black trapezoidal marking.

Head: Frons with dense, moderate punctures, rugous; vertex with moderate confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments see Fig. 12A.

Pronotum: Average length at middle 0.99 mm, average width at middle 1.86 mm; disc with moderate punctures, interspace with some scattered fine punctures, diameter of punctures same as those of frons; laterally with much sparser punctures; posterior margin with denser and larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.8 mm, width at middle 1.5 mm; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with fine, sparse punctures (Fig. 12B).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with sparse punctures and pubescence; metaventrite with large, sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered and slightly pointed apically; in lateral view bent at right angles (Figs. 12C, 12D).

Spermatheca: Unknown.

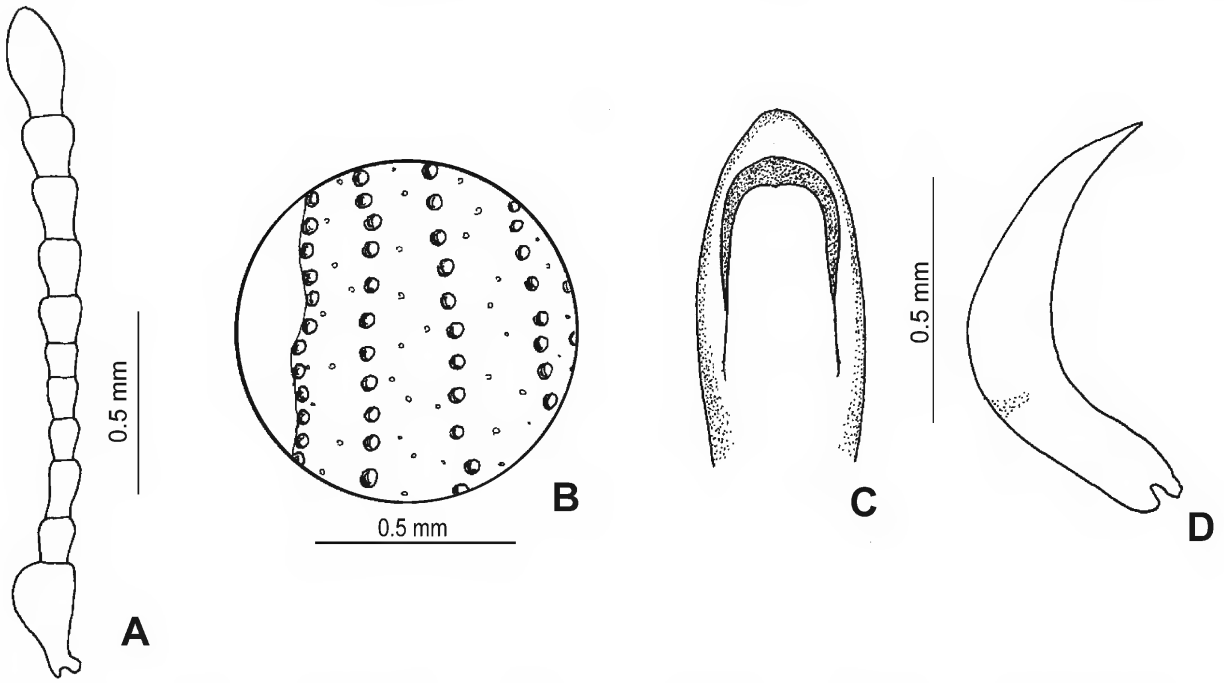

Fig. 12. *Odontoedon limbatus* (Lopatin). – **A**. Antenna, ♂. **B**. Elytral punctures (schematic). **C**. Aedeagus, dorsal view. **D**. Aedeagus, lateral view.

Differential diagnosis

The species is similar to *O. lopatini*. The latter species differs from the new one in the pronotum with coarse and sparse punctures and the interspace without fine punctures.

Distribution

China: Sichuan.

Odontoedon lopatini Ge & Daccordi, **n. sp.**
(Figs. 1E, 5E, 5F, 13)

Holotype (♂): "China, Yunnan prov., 18.6.–4.7.1993, Heishui = 35 km N Lijiang, 27°13'N, 100°19'E, lgt. S. Becvar" (IZAS).

Paratypes: 1 ♂, 2 ♀♀, "Yunnan, 3500–4000 m, 27°10'N, 100°13'E, Yulongshan Mts, 16.–19.VI.1993, lgt. Vít Kubáň" (1 ♂, 1 ♀ MDC; 1 ♀ IZAS). – 1 ♀, "Yunnan, 17.–19.vii.1996, 27°14'N, 99°27'E, 3300 m, Hengduan mts-Yungling, Vít Kubáň leg." (IZAS). – 2 ♂♂, 1 ♀, "Yunnan, 16.–19.Jun.1993, Yulong Mts., 27°10'N, 100.13'E, 3900 m, Bolm lgt." (1 ♂, 1 ♀ MDC; 1 ♂ IZAS). – 3 ♀♀, "Cina [China] NW Yunnan, S. of Lijang, V-99, Wenfeng" (MDC). – 1 ♂, "N. W. Yunnan 6-98, N of Lijang, Jade Dragon Mt.", collector unknown (MDC). – 2 ♂♂, 1 ♀, "China pr. Yunnan bor., Heishui env., 24.–28.5.1993, R. Cervenke lgt." (MDC). – 2 ♂♂, 1 ♀, "China NW Yunnan Bai Ma Xue Shan, 35 km S Degen, h = 4300–4800 m, 24.vi.1998, lgt. S. Murzin" (MDC).

Etymology

Named after the Russian entomologist, Prof. Igor Lopatin (1923–2012), for his work on Chrysomelidae.

Description

Measurements: Body length 3.70–4.25 mm, body width 2.35–2.60 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1E).

Coloration: Head, antennae, mouthparts, legs, and underside of body dark; pronotum and lateral margin of elytra reddish brown, central disc of pronotum with a large black trapezoidal marking.

Head: Frons slightly depressed, flattened along antennal sockets, with dense and moderate punctures, rugous; vertex with moderate confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 13A, 13B.

Pronotum (Fig. 5E): Average length at middle 1.15 mm, average width at middle 2.15 mm; disc with moderate and sparse punctures, diameter of punctures same as those of frons (Fig. 5F); laterally with much sparser punctures; posterior margin with denser and larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 3.3 mm, width at middle 2.9 mm; convex; abbreviated scutellar stria plus 10 complete striae

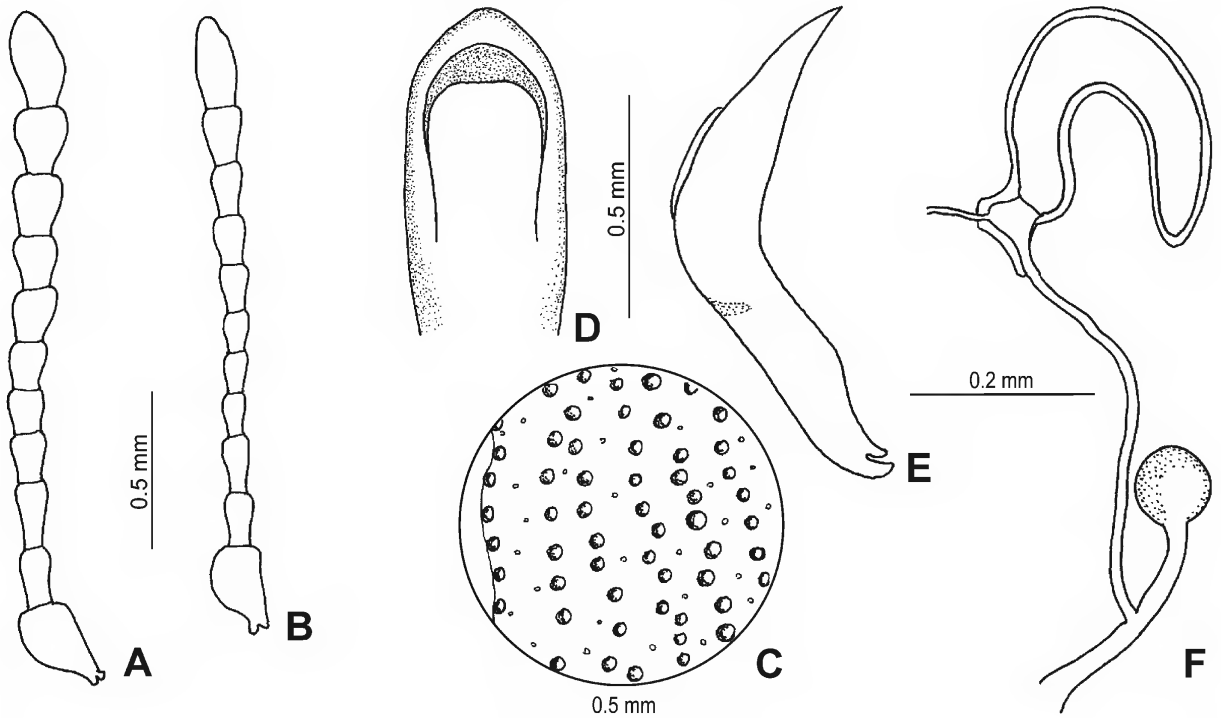

Fig. 13. *Odontoedon lopatini* n. sp. – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

composed of deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with small, dense punctures (Fig. 13C).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically rounded, slightly broadened, central area with a longitudinal ridge; with sparse punctures and pubescence; metaventrite with large and sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered and slightly pointed apically; in lateral view bent at right angles (Figs. 13D, 13E).

Spermatheca: Falciform, with long convoluted duct and bulbiform structure (Fig. 13F).

Differential diagnosis

The new species is similar to *O. limbatus*. The latter differs from *O. lopatini* by the pronotum with coarse and dense punctures and the interspace with scattered fine punctures.

Distribution

China: Yunnan.

Odontoedon maculicollis (Chen, 1974), **n. comb.** (Fig. 14)

Phaedon maculicollis Chen, 1974: 46.

Material examined

Holotype: ♂, "Sichuan: Emeishan, 1600–2100 m, 1955-VI-24, leg. Shu-Yong Wang" (IZAS). – Allotype, ♀, same data as holotype (IZAS). – Paratypes: 2 ♀♀, same data as holotype (1 in IZAS, 1 in MDC).

Other material: 1 ♂, Sichuan: Emeishan, Xixiangchi, 1800–2000 m, 19.VIII.1957, leg. Fu-Xing Zhu (IZAS). – 1 ♂, PT, China, Sichuan, Emei Shan, 3000 m, 28°32'N, 103°21'E, leg. J. Farkač, P. Kabatek and A. Smetana (MDC). – 1 ♂, China, Si Schuan, Enri Shan, 4.VI.1992, leg. Sauer (MDC).

Redescription

Measurements: Body length 4.1–5.0 mm, body width 2.40–2.65 mm.

Habitus: Body sub-spherical, strongly convex.

Coloration: Head and elytra greenish aeneous with ground colour black; prothorax reddish brown, central disc black; underside of body castaneous black, abdomen sometimes largely testaceous.

Head: Frons slightly depressed, with dense, small punctures; vertex shagreened, with moderate, dense, con-

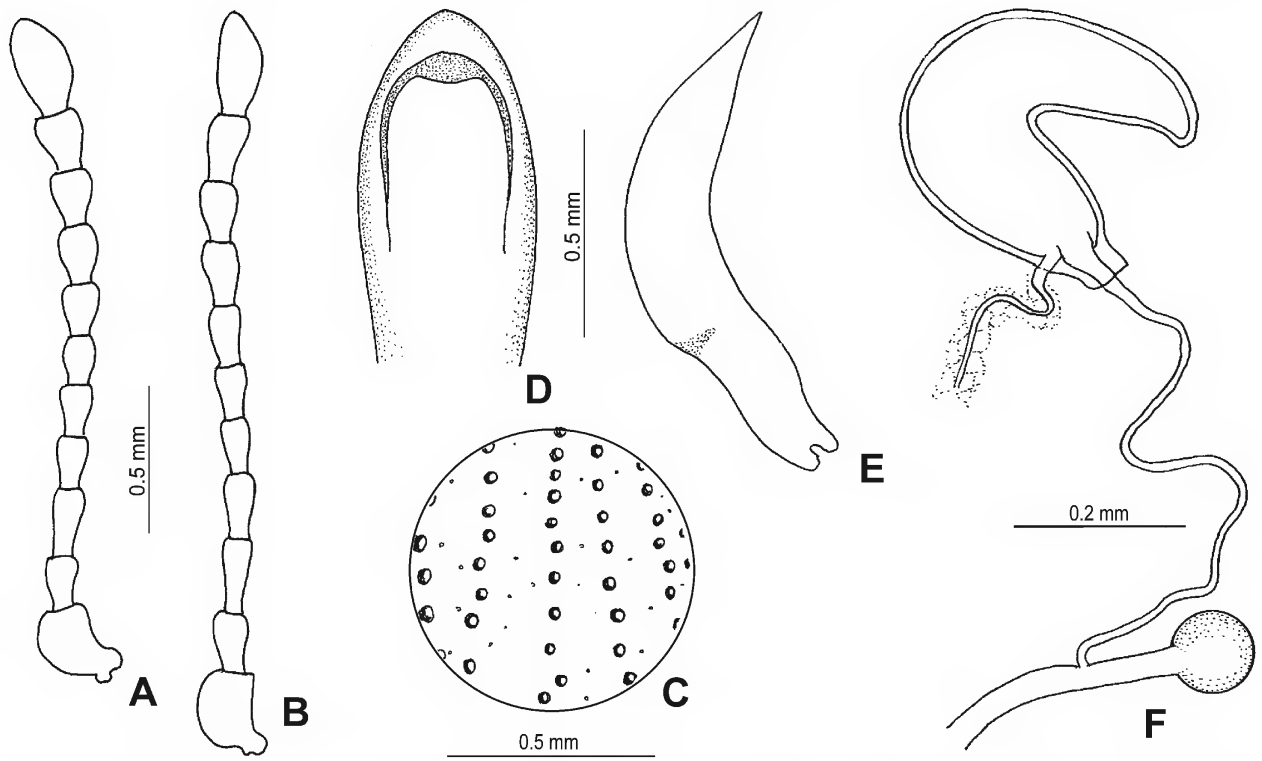

Fig. 14. *Odontoedon maculicollis* (Chen). – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

fused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 14A, 14B.

Pronotum: Average length at middle 1.25 mm, average width at middle 2.35 mm; lateral margins evenly, slightly narrower at anterior angles, with a line of punctures along lateral margins; disc with moderate and sparse punctures, diameter of punctures same as those of vertex; with finer punctures densely interspersed; laterally with much sparser punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 4.15 mm, width at middle 3.6 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, dense and very large punctures, 3 times as large as those of pronotum, ninth stria with very sparse punctures; interspace surface, with very sparse, fine punctures (Fig. 14C).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence; metaventrite with large and sparse punctures, similar to those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered and slightly pointed apically; in lateral view bent at right angles (Figs. 14D, 14E).

Spermatheca: Falciform, with long convoluted duct, without bulbiform structure (Fig. 14F).

Differential diagnosis

This species is close to *O. fulvescens*, but has a very different body coloration, the terminal segments of the antennae distinctly more elongate, and the hind wings absent.

Distribution

China: Sichuan.

Odontoedon potentillae (Wang, 1992), **n. comb.**
(Figs. 5G, 5H, 15)

Phaedon potentillae Wang, 1992a: 633.

Material examined

Holotype: ♂, "Sichuan: Dege, Keluodong, 3600 m, 1983-VIII-5, leg. Shu-Yong Wang" (IZAS). – Paratypes: 2♂♂, 2♀♀, same data as holotype (IZAS). – 2♂♂, 2♀♀, "Sichuan: Kangding, Gonggashan, west slope, Gongga Temple, 3530–3650 m, 1982-XI-2, leg. Shu-Yong Wang" (IZAS).

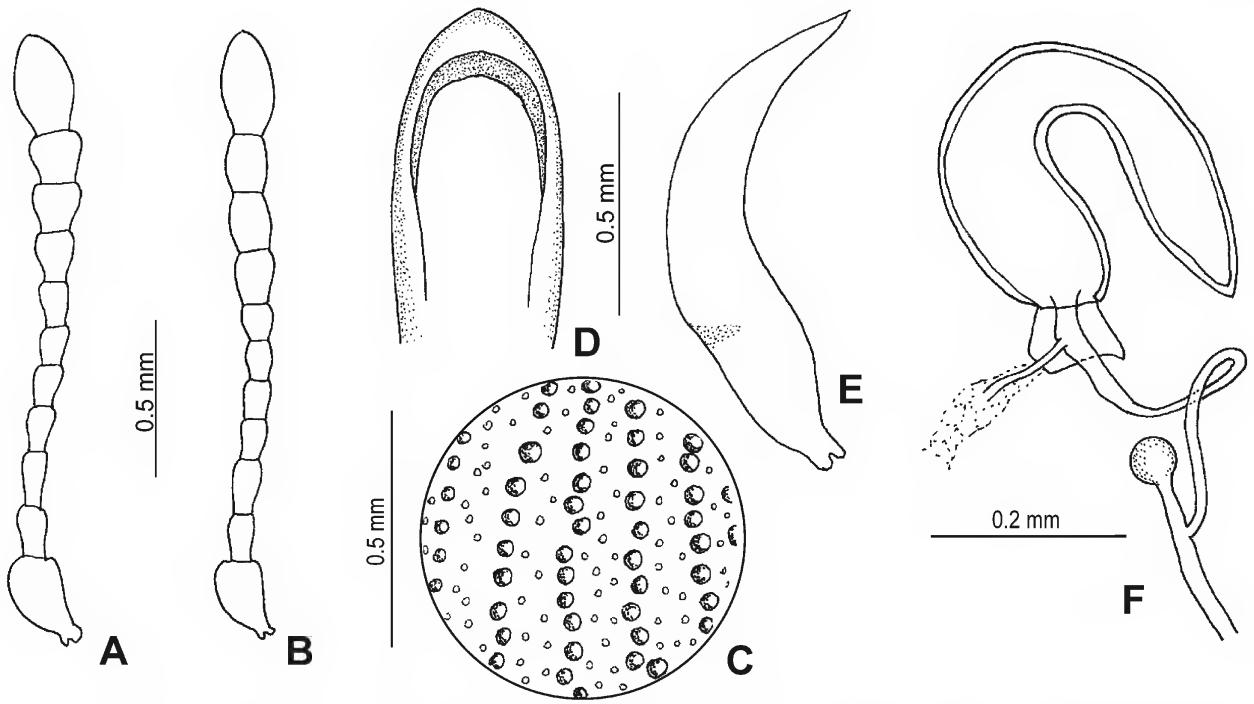

Fig. 15. *Odontoedon potentillae* (Wang). – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

Redescription

Measurements: Body length 3.50–3.75 mm, body width 2.25–2.75 mm.

Coloration: Body bronze, with purple metallic shine; pronotum laterally reddish brown, middle part black; antennae dark.

Habitus: Body sub-spherical, convex dorsally.

Head: Frons slightly depressed, with sparse, small punctures; vertex shagreened, with moderate, dense, confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 15A, 15B.

Pronotum (Fig. 5G): Average length at middle 1.0 mm, average width at middle 1.75 mm; lateral margins evenly, slightly narrower at anterior angles, with a line of punctures along lateral margins; disc with moderate and sparse punctures, diameter of punctures same as those of vertex; with finer punctures densely interspersed (Fig. 5H); laterally with much sparser punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.5 mm, width at middle 2.25 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, dense and very large punctures, 3 times as large as those of pronotum, ninth stria with very sparse punctures; interspace surface with dense and fine punctures.

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures, pubescent, apically rounded, slightly broadened, central area with a longitudinal ridge; metaventrite with large and sparse punctures, similar to those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered and slightly pointed apically; in lateral view bent at right angles (Figs. 15D, 15E).

Spermatheca: Falciform, with long convoluted duct, without bulbiform structure (Fig. 15F).

Differential diagnosis

The species is similar to *O. maculicollis*, but it can be distinguished by the following characters: body small, 3.50–3.75 mm in length; central disc of pronotum with coarse, dense punctures; interspace of elytra with fine, very dense punctures.

Distribution

China: Sichuan.

Host plant

Only *Potentilla* sp. is known as host plant.

Odontoedon rufulus Ge & Daccordi **n. sp.**
(Figs. 1F, 16)

Holotype (♂): "CH. W Yunnan SW Liuku, 25 43 13N / 98 45 49E, H 3375 m, 18.05.2006, Belousov & Kabak leg." (ZIN).

Paratypes: 1 ♀, 1 ♀, same data as holotype (1 ♀ ZIN, 1 ♀ IZAS). – 1 ♂, 1 ♀, "China: Yunnan [CH07-26], Nujiang Lisu Aut. Pref., Gaoligong Shan, pass 24 km NW Liuku or 7 km E Pianma, 25°58'22"N; 98°41'00"E, 3150 m, bamboo with shrubs, litter sifted, 9.VI.2007, leg. A. Pütz" (MDC). – 1 ♀, same data as before (APC).

Etymology

From Latin, rufus = red; *rufulus* means the reddish brown body colour of the new species.

Description

Measurements: Body length 3.15–3.90 mm, body width 2.0–2.5 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1F).

Coloration: Head dark, underside of body, femora, tarsi, antennomeres III–XI dark brown, pronotum, scutellum and elytra reddish brown.

Head: Frons slightly depressed, with sparse, small punctures; vertex shagreened, with moderate, dense, confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 16A, 16B.

Pronotum: Average length at middle 0.9 mm, average width at middle 1.6 mm; lateral margins evenly, slightly narrower at anterior angles, with a line of punctures along lateral margins; anterior margin widely emarginate with projecting anterior angles; posterior angles obtuse; anterior, lateral and posterior margins with raised bead; disc with moderate, sparse punctures, diameter of punctures same as those of vertex; with finer punctures densely interspersed; laterally with much sparser punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.4 mm, width at middle 2.25 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, dense and large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with fine, sparse punctures (Fig. 16C).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence; metaventrite with large, sparse punctures, similar to those of the elytra; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

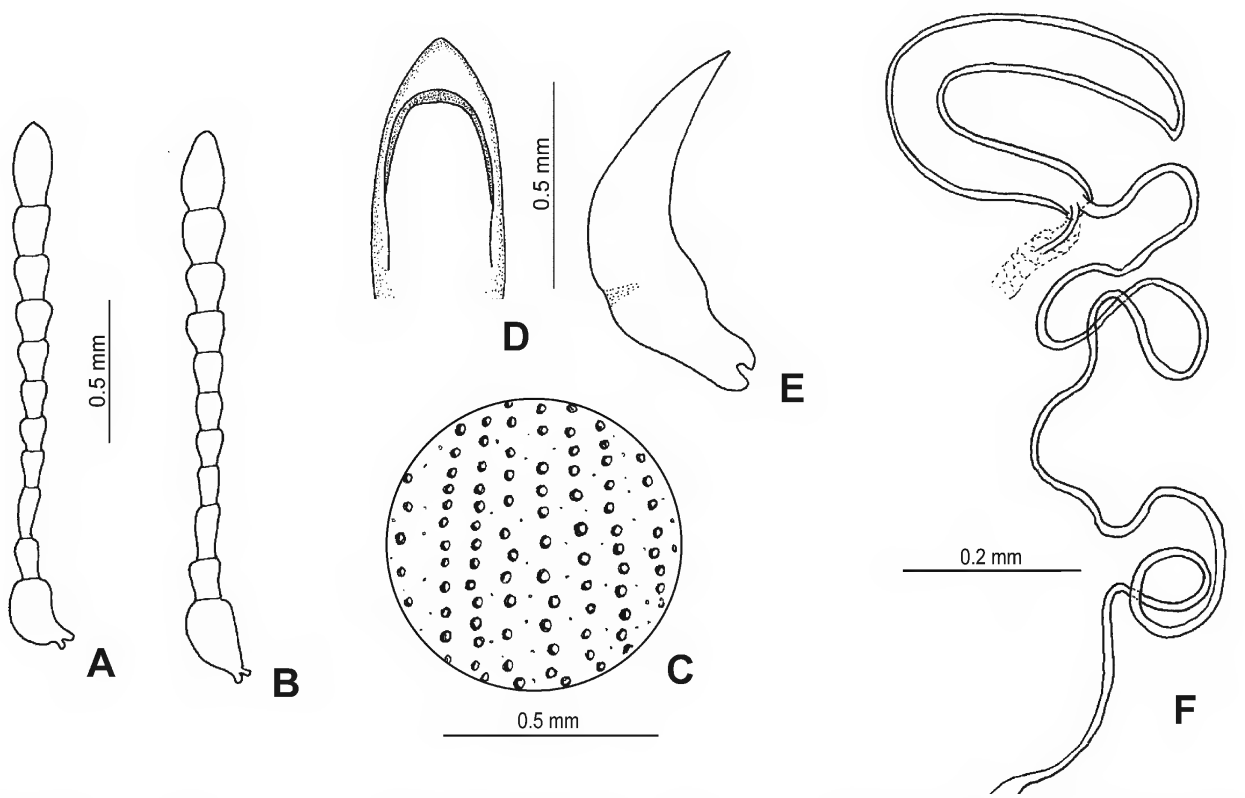

Fig. 16. *Odontoedon rufulus* n. sp. – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

Aedeagus: In dorsal view broadened basally, tapered and slightly pointed apically; in lateral view bent at right angles (Figs. 16D, 16E).

Spermatheca: Falciform, with long convoluted duct, without bulbiform structure (Fig. 16F).

Differential diagnosis

The new species is similar to *Odontoedon fulvescens*, but it can be distinguished by the relatively small body, the black head, and the spermatheca without bulbiform structure.

Remark

We use the name which was proposed by Lopatin in 2007 (in litt.) for the three specimens from W Yunnan (SW Liuku).

Distribution

China: Sichuan.

Odontoedon sericeus Daccordi & Ge, **n. sp.**
(Figs. 1G, 5I, 5J, 17)

Holotype (♂): "China (Sichuan) n. Kangding: see Mu-ge-cuo, 3500–3900 m, 22.VII.1994, Heinz leg." (IZAS).

Paratypes: 1 ♀, 2 ♀♀, same data as holotype (1 ♀ MDC, 2 ♀♀ HKC). – 1 ♂, 3 ♀♀, "China, Sichuan prov., Daxueshan Mts., Gongga Shan Mt. Env. 15 km, S. Kangding, 3200–3500 m, 5.–10.VII.2007, A. Plutenko leg." (1 ♂, 1 ♀ MDC, 2 ♀♀ APC). – 1 ♂, 1 ♀, "China, W. Sichuan Ganzi Tibetian Auton. Pref. Daxue Shan, Mugecuo 15 km NW Kangding, upper lake 30 08 18N, 101 51 18E, 3700 m, 27.VI.1999, leg. A. Pütz" (APC). – 1 ♂, 1 ♀, "China, W. Sichuan Ganzi Tibetian Anton. Pref. Daxue Shan, 10 km S Kangding, 3150 m, 29.59 N, 101.55 E, 30.VI.1999, leg. A. Pütz" (MDC). – 1 ♂, 1 ♀, "China, W. Sichuan (Ganzi Tibet Aut. Pref., Kangding Co.), Daxue Shan, river valley, 10 km S. Kangding, 3150 m, 29.59N/101.55E, 26.–30.VI.1999, D. W. Wrase" (NMEG). – 1 ♂, "China, Sichuan pr. Kangding distr., 16.[–]19.7.1992, Mugezo lake 4500 m, R. Dunda, lgt." (MDC).

Etymology

From Latin, sericeus = silk like shining, means the silk like shining on the pronotum of the new species.

Description

Measurements: Body length 3.20–3.65 mm; body width 2.05–2.45 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1G).

Coloration: Head, antennomeres III–XI, and femora dark; pronotum, elytra, and underside of body reddish brown; prosternum, mesoventrite, metaventrite and first abdominal segment darker.

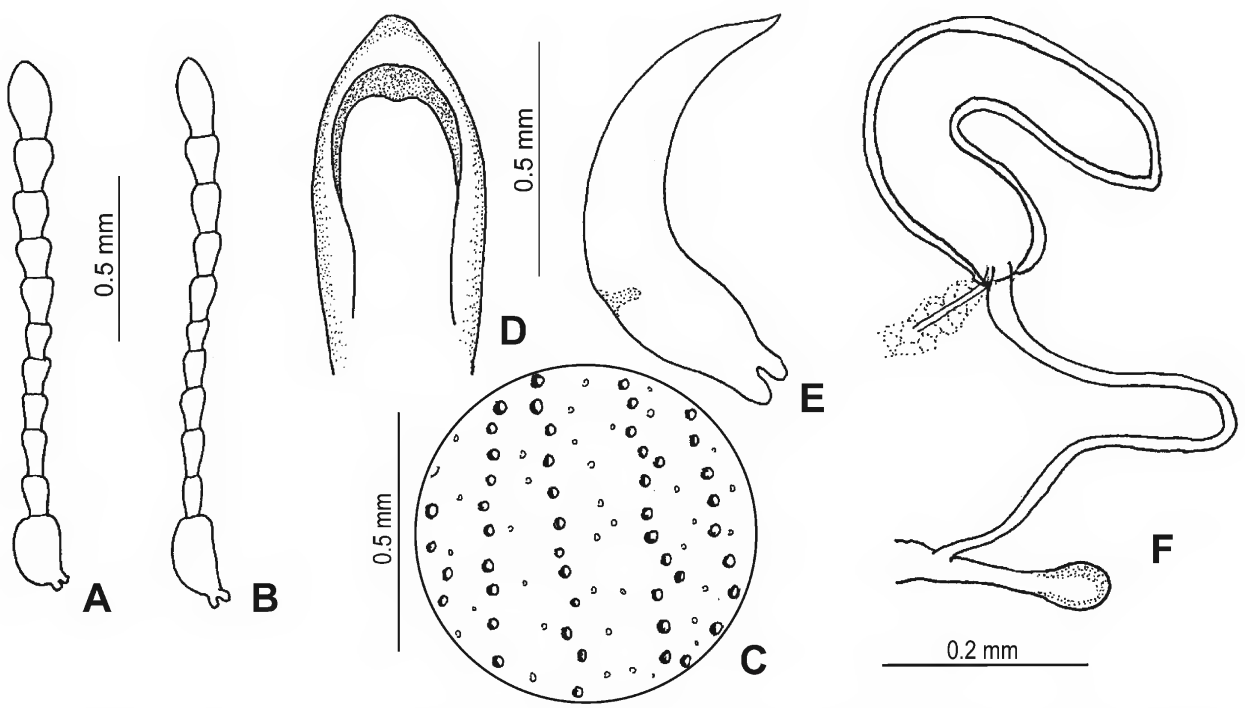

Fig. 17. *Odontoedon sericeus* n. sp. – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

Head: Frons slightly depressed, with dense, moderate punctures; vertex with moderate confused punctures, close to eyes with larger punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 17A, 17B.

Pronotum: Average length at middle 0.65 mm, average width at middle 1.65 mm; disc with moderate and dense punctures, diameter of punctures same as those of frons; with finer punctures interspersed (Fig. 5J); laterally with much sparser punctures; posterior margin with denser, larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.55 mm, width at middle 2.5 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, twice as large as those of pronotum, ninth stria with very sparse punctures; interspace surface with small, dense punctures (Fig. 17C).

Hind wings: Absent.

Underside: Prosternal process very wide, flat, with a longitudinal ridge, lateral margins subparallel, with punctures and pubescence, apically truncated; with sparse punctures and pubescence; metaventrite with large, sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 17D, 17E).

Spermatheca: C-shaped, duct long with bulbiform structure (Fig. 17F).

Differential diagnosis

This species is quite different from other species of the new genus *Odontoedon* by the following characters: head and pronotum glazed; prosternal process short, wide and without longitudinal carina medially.

Distribution

China: Sichuan.

Odontoedon sichuanus Daccordi & Ge, **n. sp.**
(Fig. 18)

Holotype (♂): "China: Sichuan, Bijshan, 12-07-00, Kabak" (ZIN).

Etymology

Named after the type locality of the specimen.

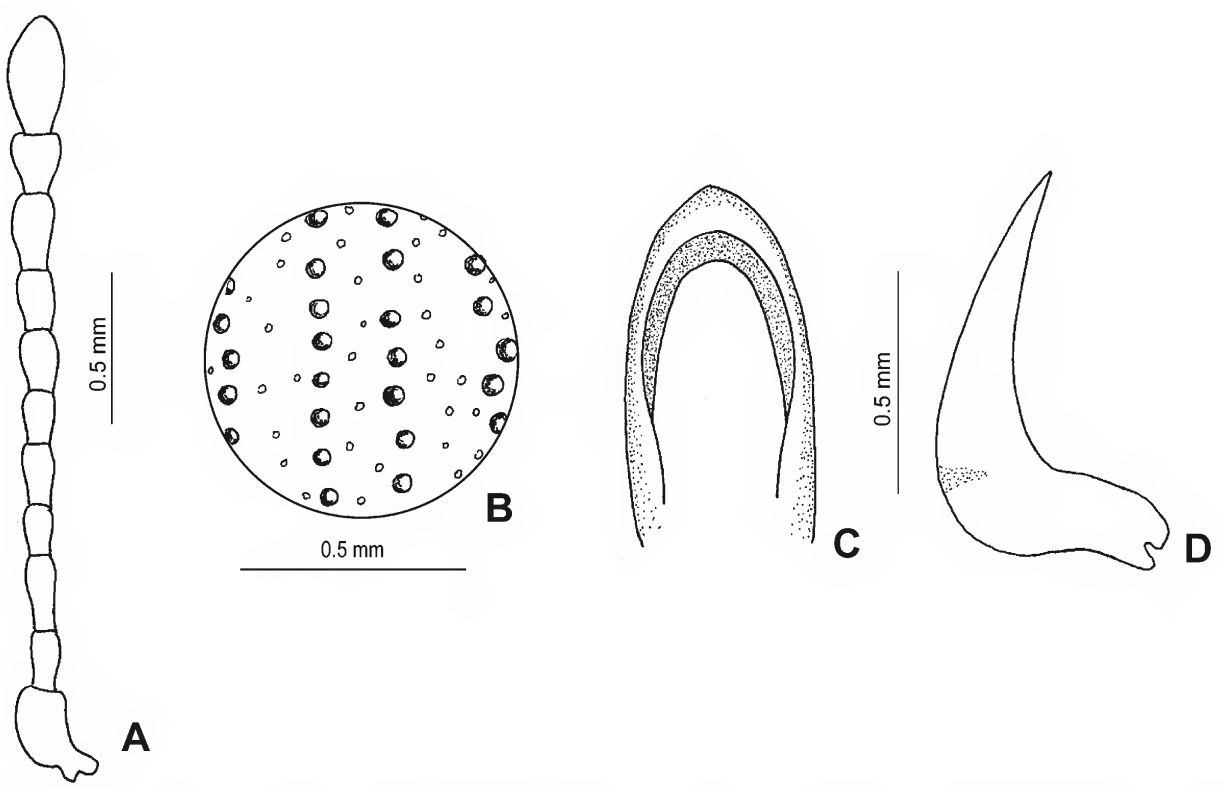

Fig. 18. *Odontoedon sichuanus* n. sp. – **A**. Antenna, ♂. **B**. Elytral punctures (schematic). **C**. Aedeagus, dorsal view. **D**. Aedeagus, lateral view.

Description

Measurements: Body length 4.3 mm, body width 3.0 mm.

Habitus: Body sub-spherical, strongly convex.

Coloration: Head, antennae, elytra, and underside of body dark sepia brown; pronotum warm sepia brown with nuances of walnut brown.

Head: Frons with dense, moderate punctures; vertex with moderate confused punctures; eyes elliptical; metopic suture absent, fronto-clypeal suture very thin. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments see Fig. 18A.

Pronotum: Average length at middle 2.4 mm, average width at middle 1.2 mm; disc with moderate, dense punctures, diameter of punctures same as those of frons; laterally with much sparser punctures; posterior margin with denser, elongate punctures at sides, in the middle with a few fine punctures only.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 3.4 mm, width at middle 1.9 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with small, dense punctures (Fig. 18B); anterior margin of elytra in lateral view very gently curved, apical area strongly impressed and sharpened on apex.

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence; mesoventrite with sparse punctures and pubescence; metaventrite with large, sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 18C, 18D).

Spermatheca: Unknown.

Differential diagnosis

This new species is similar to *O. chinensis* (Gressitt & Kimoto) but differs in the punctation of the elytra (elytral interspaces of *O. sichuanus* narrower than in *O. chinensis*), the punctures of the striae (more deeply impressed in *O. sichuanus*), and the apical area of the elytra (not impressed and the apex round in *O. sichuanus*). In lateral view the anterior margin of the elytra is gently curved in *O. sichuanus*, deeply rounded in *O. chinensis*.

Distribution

China: Sichuan.

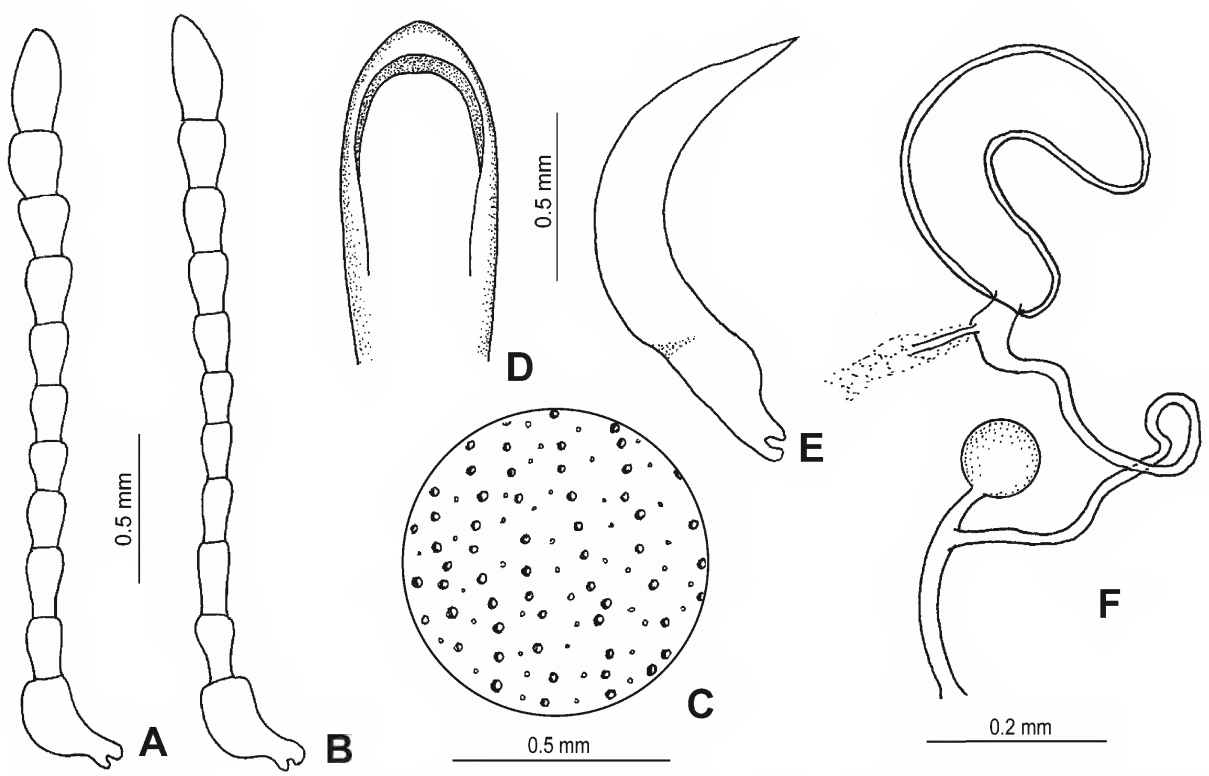

Fig. 19. *Odontoedon taiwanus* n. sp. – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytral punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

Odontoedon taiwanus Ge & Daccordi, **n. sp.**
(Figs. 1H, 19)

Holotype (♂): "Taiwan Taichung Hsien, Hseuhshan, nr. Hsuehshan Tun-Feng 3170 m, 11.V.91., A. Smetana [T76]" (CNC).

Paratypes: 1♂, same data as holotype (MDC). – 2♀♀, "Taiwan Taichung Hsien, Hseuhshan, nr. Hsuehshan Tun-Feng 3170 m, 7.V.91., A. Smetana [T68]" (1♀ IZAS, 1♀ MDC). – 1♀, "Taiwan Nantou Hsien Yushan N.P. W. Slope, blw, Yushan Mn. PK. 3720 m, 15.v.1991., A. Smetana [T81]" (MDC). – 2♂♂, "Taiwan Nantou Hsien Yushan N.P., 1.8 km W Pai-Yun Hut 3375 m, 17.v.91., A. Smetana [T85]" (MDC). – 1♀, "Taiwan Nantou Hsien Yushan N.P. W. Slope, blw, Yushan Mn. PK. 3650 m, 14.v.1991., A. Smetana [T80]" (IZAS). – 1♀, "Taiwan Nantou Hsien Yushan N.P. Pai Yun Hut, 3528 m, 15.v.1991., A. Smetana [T83]" (MDC).

Etymology

Named after the country where the specimens have been collected.

Description

Measurements: Body length 4.70–4.85 mm, body width 2.70–2.75 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1H).

Coloration: There are two differently coloured forms: (A) Head, antennae, mouthparts, scutellum, legs, and underside of body dark; pronotum and lateral margins of elytra yellowish brown; central disc of pronotum near anterior margin with a dark trapezoidal marking (sometimes this marking absent or very small and of triangular shape). – (B) Body black; pronotum reddish brown, central disc with a large dark trapezoidal marking over entire pronotal length (sometimes the marking small or absent).

Head: Frons slightly depressed, flattened along antennal sockets, with dense and moderate punctures; vertex with moderate confused punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 19A, 19B.

Pronotum: Average length at middle 1.05 mm, average width at middle 2.75 mm; much narrower at base than elytra; rectangular; disc with moderate, dense punctures, diameter of punctures same as those of frons; laterally with much sparser punctures; posterior margin with denser, larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 3.25 mm, width at middle 3.25 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with small, dense punctures (Fig. 19C).

Hind wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically rounded, slightly broadened, central area with a longitudinal ridge; process of mesoventrite with sparse punctures and pubescence; metaventrite with large, sparse punctures, larger than those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 19A, 19B).

Spermatheca: C-shaped, duct long with bulbiform structure (Fig. 19F).

Differential diagnosis

Odontoedon taiwanus n. sp. is similar to *O. fulvescens*, but differs from the latter species in the elytral interspace with sparse, fine punctures and the absence of the hind wings.

Distribution

China: Taiwan.

Odontoedon thibetanus Ge & Yang, **n. sp.**
(Figs. 1I, 5K, 5L, 20)

Holotype (♂): "Tibet (Nyingtri) Serkyni-la (SW. Seite) 3800/3900 m, 27/28.VI.1995, Heinz leg." (IZAS).

Paratypes: 2♂♂, 4♀♀, same data as holotype, (1♀ IZAS; 1♂, 2♀♀ MDC; 1♂, 1♀ HKC). – 1♂, "Tibet, Nyingchi, Schgyla Mountain Pass Under Rocks, 29.61033°N/ 94.65156°E, 4565 m, 2006.9.1 leg. Liang H B. & Bai M. ex Chin. Ac. Sc." (MDC).

Etymology

Named after the locality of the specimens.

Description

Measurements: Body length 3.9–4.1 mm, body width 2.25–2.35 mm.

Habitus: Body sub-spherical, convex dorsally (Fig. 1I).

Coloration: Head, underside of body, antennomeres III–XI, apex of femora, base of tibiae, and tarsi dark; pronotum, antennomeres I–II, base and middle of femora, middle and apex of tibiae reddish brown; central disc of pronotum with a large black marking which covers half of the pronotum.

Head: Frons slightly depressed, flattened along antennal sockets, with dense, moderate punctures, rugous; vertex with moderate confused punctures, under eyes with larger, coarser punctures; eyes elliptical. – Antennae: Slender, extending well beyond base of elytra, segments 7–11 with dense pubescence; ratio of antennal segments of ♂ and ♀ see Figs. 20A, 20B.

Pronotum: (Fig. 5K): Average length at middle 1.15 mm, average width at middle 1.75 mm; much nar-

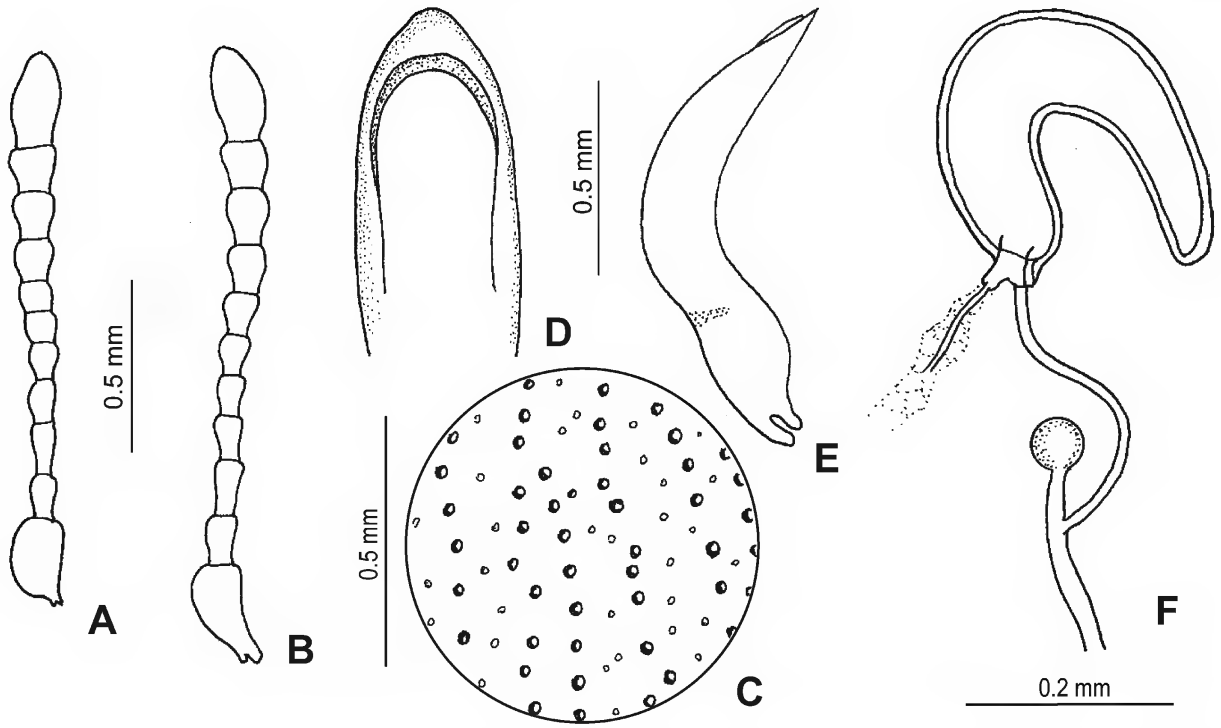

Fig. 20. *Odontoedon thibetanus* n. sp. – **A**. Antenna, ♂. **B**. Antenna, ♀. **C**. Elytra punctures (schematic). **D**. Aedeagus, dorsal view. **E**. Aedeagus, lateral view. **F**. Spermatheca.

rower at base than elytra; rectangular; disc with moderate, dense punctures, diameter of punctures same as those of frons; with finer punctures densely interspersed (Fig. 5L); laterally with much sparser punctures; posterior margin with denser, larger punctures.

Scutellum: Sub-triangular, smooth, impunctate.

Elytra: Length 2.75 mm, width at middle 2.6 mm; convex; abbreviated scutellar stria plus 10 complete striae composed of deep, large punctures, larger than those of pronotum, ninth stria with very sparse punctures; interspace surface with small and dense punctures (Fig. 20C).

Hing wings: Absent.

Underside: Lateral margins of prosternal process with punctures and pubescence, apically rounded, slightly broadened, central area with a longitudinal ridge; process of mesoventrite with sparse punctures and pubescence; metaventrite with large and sparse punctures, similar to those of the elytra, anterior margin emarginate; abdominal sternites with small, shallow, sparse punctures and sparse pubescence.

Aedeagus: In dorsal view broadened basally, tapered to apex, slightly pointed apically; in lateral view bent at right angles (Figs. 20D, 20E).

Spermatheca: Falciform, duct long with bulbiform structure (Fig. 20F).

Differential diagnosis

This new species is similar to *O. taiwanus*. The latter species differs in the following characters: body short ovoid, tibiae black, central disc of pronotum near anterior margin with a little pale black trapezoidal marking (sometimes this marking absent or very small with triangular shape).

Distribution

China: Tibet.

4 Key to the species of *Odontoedon* n. gen.

1 Hind wing present.....***fulvescens*** Weise
– Hing wing absent..... **2**
2 Prosternal process short, wide, flat, smooth, anterior part rising. **3**
– Prosternal process long, narrow, with a longitudinal carina in the middle, shining. – Head, thorax and elytra shiny..... **4**
3 Head, thorax and elytra silk-opaque; red margin on elytra narrow. ..... ***sericeus* n. sp.**
– Head, thorax and elytra shiny; red margin on elytra wide..... .....***limbatus*** Lopatin
4 Body uniformely coloured in black, cyanine blue or sepia brown. **5**

– Body bicoloured or red coloured in different nuances. **6**

5 Punctures in elytral striae deep, seventh and eighth interstriae narrow. Anterior part of elytra, in lateral view, almost straight; apex of elytra impressed and with a sharp corner. ..... ***impressus* n. sp.**

– Punctures in elytral striae light, seventh and eighth interstriae enlarged as the others are. Anterior part of elytral margin, in lateral view, sinous; apex of elytra not impressed, rounded. ... . ***chinensis*** Gressitt & Kimoto

6 Elytra and prothorax red in different nuances. **7**

– Elytra black with or without red margin; prothorax entirely red or bicoloured. **8**

7 Prothorax and elytra with strong punctures; scutellum red or brown. ..... ***rufulus* n. sp.**

– Prothorax and elytra with fine punctures; scutellum black. .... ***taiwanus* n. sp.**

8 Elytra with red margin, bicoloured. **9**

– Elytra without red margin, unicoloured. **10**

9 Pronotum completely red or with a dark shade. .... ***kippenbergi* n. sp.**

– Pronotum with a large, trapezoidal, black spot in the middle. ..... ***lopatini* n. sp.**

10 Pronotum red, occasionally with a dark shading in the middle. ..... ***taiwanus* n. sp.**

– Pronotum bicoloured, sides red with a black trapezoidal spot in the middle. **11**

11 Body length longer than 5 mm; with very strong and big elytral punctures. ..... ***impressus* n. sp.**

– Body length shorter than 4.5 mm; with elytral punctures not strong and big. **12**

12 Pronotum punctate; elytral strial punctures very coarse, sometimes very close to each other. ..... ***potentillae*** Wang

– Pronotum punctate; punctures of elytral striae separated by a distance of 2–3 diameters. **13**

13 Prothorax transverse; small, body length 2.9 mm. .... ***globosus* n. sp.**

– Prothorax trapezoidal; body length longer than 3.8 mm..... **14**

14 Tibiae red; body ovoid or elypsoid; clypeus with sparse punctures. ..... ***thibetanus* n. sp.**

– Tibiae black; body shortly ovoid; clypeus with dense punctures. ..... ***maculicollis*** Chen

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Speciation in *Graphium sarpedon* (Linnaeus) and allies (Lepidoptera: Rhopalocera: Papilionidae)

Malcolm G. P. Page & Colin G. Treadaway

Abstract

The relationships between subspecies of *Graphium sarpedon* (Linnaeus, 1758) and closely allied species have been investigated. This group appears to comprise eight sibling species, as follows: *Graphium sarpedon* (Linnaeus, 1758), *G. adonarensis* (Rothschild, 1896) **stat. rev.**, *G. anthedon* (Felder & Felder, 1864), *G. milon* (Felder & Felder, 1865) **stat. rev.**, *G. isander* (Godman & Salvin, 1888) **stat. rev.**, *G. choredon* (Felder & Felder, 1864) **stat. rev.**, *G. teredon* (Felder & Felder, 1864) **stat. rev.**, *G. jugans* (Rothschild, 1896) **stat. rev.** The following new subspecies are described: *G. sarpedon sirkari* **n. subsp.** from N. India and S. China, *G. adonarensis hundertmarki* **n. subsp.** from Bali, *G. adonarensis agusyantoei* **n. subsp.** from Sumatra, *G. adonarensis phyrisoides* **n. subsp.** from Bangka and Belitung, *G. adonarensis toxopei* **n. subsp.** from Lombok, *G. adonarensis septentrionicolus* **n. subsp.** from N. India and E. China.

Keywords: Lepidoptera, Papilionidae, *Graphium sarpedon*, new subspecies.

Zusammenfassung

Die Beziehungen zwischen den Unterarten von *Graphium sarpedon* (Linnaeus, 1758) und anderer nahestehender Arten der Gattung werden untersucht. Diese Gruppe nahe verwandter Arten enthält wahrscheinlich acht Taxa wie folgt: *Graphium sarpedon* (Linnaeus, 1758), *G. adonarensis* (Rothschild, 1896) **stat. rev.**, *G. anthedon* (Felder & Felder, 1864), *G. milon* (Felder & Felder, 1865) **stat. rev.**, *G. isander* (Godman & Salvin, 1888) **stat. rev.**, *G. choredon* (Felder & Felder, 1864) **stat. rev.**, *G. teredon* (Felder & Felder, 1864) **stat. rev.** und *G. jugans* (Rothschild, 1896) **stat. rev.** Die folgenden neuen Unterarten werden beschrieben: *G. sarpedon sirkari* **n. subsp.** aus Nord-Indien, *G. adonarensis hundertmarki* **n. subsp.** aus Bali, *G. adonarensis agusyantoei* **n. subsp.** aus Sumatra, *G. adonarensis phyrisoides* **n. subsp.** aus Bangka und Belitung, *G. adonarensis toxopei* **n. subsp.** aus Lombok und *G. adonarensis septentrionicolus* **n. subsp.** aus Nord-Indien und Ost-China.

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1 Introduction

The Common Bluebottle, or Blue Triangle, is a wide-ranging butterfly found throughout eastern Asia from Japan to Australia. It has long been treated as the single species *Graphium sarpedon* (Linnaeus, 1758) throughout its wide distribution. Murayama (1978) recognised a separate species under the name *Graphium milon* (Felder & Felder, 1865) that included subspecies from the Sula islands and Moluccas. The separation was based on external morphology and differences in the structure of the male genitalia. The external morphological characters were largely defined on the basis of *G. milon* from Sulawesi. The principal characters were: median band uniformly blue and

uniform in width; whitish spot in space 7 more white than in *G. sarpedon*; black radius and cubitus of hindwing cell; submarginal lunules large, prominent and acutely angled. Tsukada & Nishiyama (1982) noted that the Moluccan subspecies do not entirely conform to these characters but that they were nevertheless closer to *G. milon* than to *G. sarpedon*. Moonen (1998) and Vane-Wright (Vane-Wright & De Jong 2003, Peggie et al. 2005) pointed out that *Papilio milon* Felder & Felder was not validly published until 1865 and is thus junior to *Papilio anthedon* Felder & Felder, 1864. These authors transferred all the subspecies assigned to *G. milon* by Tsukada & Nishiyama (1982) to *Graphium anthedon* (Felder & Felder, 1864). The races occurring in the Papuan region and Australia were assigned to *G. sarpedon* by Tsukada & Nishiyama (1982) without discussion of the disjunctive distribution pattern that such assignment creates. Further, Vane-Wright & De Jong (2003) assigned the taxa *monticolus* Fruhstorfer, 1896 and *tetrix* Tsukada & Nishiyama, 1980 to a separate species under the name of *Graphium monticolus* (Fruhstorfer, 1896), and speculated that the taxon *tetrix* Tsukada & Nishiyama, 1980 might be a separate species, based on "superficial examination of museum material". Thus, there exists some uncertainty over the proper affinities of some subspecies in this region.

Re-examination of the external features and anatomy of the male and female genitalia, as well as the available sequence data for the mitochondrial NADH dehydrogenase subunit 5 (ND5) and nuclear 28S rRNA genes, of the races in question suggests a different set of relationships. As described below, there appear to be eight morphologically distinct groups that should be treated as separate species, as follows: *Graphium sarpedon* (Linnaeus, 1758); *G. adonarensis* (Rothschild, 1896) stat. rev., which is sympatric with *G. sarpedon* in N. India and China; *G. milon* (Felder & Felder, 1865) from Sulawesi and Sula; *G. anthedon* (Felder & Felder, 1864), which includes the taxa *monticolus* and *tetrix* and is therefore sympatric with *G. milon*; *G. isander* (Godman & Salvin, 1888) stat. rev., which includes the Papuan subspecies previously assigned to *G. sarpedon*; *G. choredon* (Godman & Salvin, 1888) stat. rev. from Australia; *Graphium teredon* (Felder & Felder, 1864) stat. rev., from S. India and Sri Lanka and *G. jugans* (Rothschild, 1896) stat. rev. from Sumba, Timor and Wetar. Two additional species included in the *G. sarpedon* group, *G. sandawanum* Yamamoto, 1977 from Mindanao in the Philippines, and *G. cloanthus* (Westwood, 1845), are not considered in detail herein as they have been recently been discussed elsewhere (Page & Treadaway 2004, Racheli & Cotton 2009).

2 Methods

The male and female genitalia were dissected by removing the terminal abdominal segments and digesting these with 10 % (w/v) aqueous NaOH for 24 hr at room temperature. The preparations were washed in several changes of water and the soft tissues were removed to expose the external features. After thorough washing and clarifying by passage through 70 % ethanol, preparations were stored in 20 % (v/v) glycerol. Additional preparations of the female genitalia from specimens of *G. sarpedon* and *G. adonarensis* were made using a slower digestion, in 0.5 % NaOH, with gentle agitation. It took several days to soften the tissue, but undue swelling of the cartilaginous structures was avoided. Clarified specimens were examined unmounted using a Zeiss STEMI DV4 stereomicroscope. Digital images were recorded at 32× magnification and normalized using the dorsal and ventral ends of the chitinized rim of the clasper as fixed points for morphometric analysis (Fig. 33). The shape of the clasper was compared using the coordinates of the six points shown in Fig. 33: (a) maximum dorsal extent, (b) apex of the dorsal lobe, (c) maximum extent of the invagination of the clasper rim, (d) maximum lateral extent of the ventral lobe, (e) base of the principal spur of the brachium subcostale, (f) tip of the brachium costale. The similarity between the sets of measurements was assessed using STATISTICA 10 (StatSoft, USA).

Nucleotide sequences deposited in the National Center for Biotechnology Information (NCBI) database (http://www.ncbi.nlm.nih.gov/nuccore/) were aligned and compared using NCBI BLAST (Zhang et al. 2000, Morgulis et al. 2008) using default settings.

Under "Material examined", we list only type material and those specimens that have been available for measurement and dissection. Apart from the type material held in the collection of the Linnaean Society of London [LSLO] and the British Museum (Natural History) [BMNH], the specimens examined are currently located in the collections of the authors: Treadaway collection (part of the Senckenberg Museum, Frankfurt a. M. [CGT]) or the Page collection, Basel [MGP]. All the holotypes of the new subspecies described herein will be deposited in the Senckenberg Museum, Frankfurt a. M., Germany [SMF]. Pictures of some of the types referred to herein, marked with * in the material list, are available at http://globis.insects-online.de/species&tree_h=.Papilionidae.Papilioninae.Leptocircini.Graphium.Graphium.71&sub=no&tree_status=minus&tree_seq=23 and some of the Linneaen types, including the lectotype of *G. sarpedon*, are available at http://www.linnean-online.org/14322.

3 Morphological analysis

Visually, the *G. sarpedon* group species fall into two subgroups, according to the blue-green colour of the discal band, which is due to the different complexation state of the sarpedobilin pigments embedded in the wing membrane and of the scales overlying the pigmented wing areas (Barbier 1981, 1990, Stavenga et al. 2010). The *G. sarpedon* sub-group has green to bluish-green markings whereas the *G. anthedon* sub-group typically has turquoise-blue markings (See Figs. 1–32). Individuals may vary, and frequently one finds that bred specimens that have not had time for the bilin pigments to mature naturally (Barbier 1981), have white, or pale green markings.

The clasper (valva) of the male genitalia of the *G. sarpedon* group species has an irregular outline with distal portion of the rim divided into dorsal and ventral lobes by an invagination (Fig. 33). The dorsal lobe is relatively thick and carries the brachium subcostale (Niculescu 1977), which differs significantly between the various species (Fig. 43). The distal portion of the

ventral lobe of the clasper has a serrate or dentate rim. The harpe is degenerate, with just a raised ridge discernible in the body of the clasper and a setose projection, pointing into the cavity of the clasper, near the dorsal limit of this ridge.

Morphometric analysis demonstrates that there is relatively little variation within a species, but there is marked delineation between the species (Fig. 33). The *G. sarpedon* species group is divided into four major clusters, comprising (1) *G. teredon*, (2) *G. cloanthus*, (3) *G. adonarensis*, and (4) *G. sandawanum*, *G. sarpedon*, *G. anthedon*, *G. milon*, *G. isander* and *G. choredon*.

G. teredon is distinguished by its strongly elongated clasper, which is unlike any other species. It is strongly elongated, with a small circular invagination between the lobes (Fig. 42). The brachium subcostale has two dentate processes of unequal size, the larger spur is relatively short and has a round end that lies close to the apex of the dorsal lobe (Fig. 43). The dorsal lobe of the clasper is small and narrow, while the ventral lobe is strongly produced. The serration on the rim is coarse and strongly chitinized at the apex of the lobe, but weakens sharply away from this point.

G. cloanthus is distinguished largely by the rather square profile of the clasper and the atrophied brachium subcostale, which is represented only by a short dentate spur (Racheli & Cotton 2009).

G. adonarensis is distinguished by the relatively round profile of the clasper and long, curved brachium subcostale. The clasper of *G. adonarensis* is rounded, and the invagination between dorsal and ventral lobes is relatively shallow (Fig. 35). The brachium subcostale is a single, dentate process that curves away from the dorsal margin and crosses the rim of the clasper ventrally with respect to the distal extremity of the dorsal lobe (Fig. 43). The rim of the clasper is notched at the point where the brachium subcostale crosses it and there is additional chitinization of the rim around this point. The proximal portion of the brachium subcostale is broader than that of *G. sarpedon* and is produced to form a large serrate or dentate ridge projecting into the cavity of the clasper. The brachium subcostale curls markedly at its distal end which is, however, not as strongly dentate as in *G. sarpedon*. The serration of the ventral lobe is fine and is restricted to the distal portion of the lobe.

All the species comprising the fourth cluster have moderately elongated claspers, due to the development of the ventral lobe, and a variable brachium subcostale, whose form largely drives the sub-clustering. The clasper of *G. sarpedon* is elongated, and the invagination between dorsal and ventral lobes is relatively deep (Fig. 34). The brachium subcostale is a single, dentate process running nearly parallel to the dorsal margin of the dorsal lobe. It is straight for most of its length, with relatively small teeth, and curls slightly at its distal end which may bear several knobs or small teeth. The brachium subcostale reaches the rim of the clasper dorsally with respect to the distal extremity of the dorsal lobe, and may project slightly beyond the rim (Fig. 43). The serration of the ventral lobe is quite coarse and extends more than half way to the base of the clasper.

The clasper of *G. anthedon* is rounded, and the invagination between dorsal and ventral lobes is relatively deep (Figs. 36, 37). The brachium subcostale has two spurs of unequal size (Fig. 43). The larger spur is strongly chitinized and curves upward, crossing the margin of the clasper dorsally with respect to the distal extremity of the dorsal lobe and projecting considerably beyond it. At the base of this spur there is a smaller dentate ridge that projects into the cavity of the clasper. The dorsal lobe is quite broad and has a rounded apex. The ventral lobe is strongly chitinized and has a sharp, well-defined apex. The serration on the rim is coarse and heavily chitinized. The clasper of *G. milon* is elongated, and the invagination between dorsal and ventral lobes is relatively deep (Fig. 38). The brachium subcostale has two dentate processes of similar size (Fig. 43). One spur is oriented towards the dorsal lobe of the clasper and just crosses it at the apex. The other spur is directed perpendicular to the first and projects into the cavity of the clasper. It has a broad, dentate head which is considerably larger than the equivalent structure found in *G. anthedon* (Felder & Felder, 1864). The dorsal lobe is slender in comparison to all other species. The ventral lobe is strongly chitinized and has its apex extended as a coarsely dentate spur. The serration on the rim is coarse and strongly chitinized. The clasper of *G. isander* is rounded, and the invagination between dorsal and ventral lobes is relatively shallow (Figs. 39, 40). The brachium subcostale has two dentate processes of unequal size that are greatly reduced compared to all other species (Fig. 43). The dorsal lobe of the clasper has a rounded apex and a corrugated inner surface. The ventral lobe of the clasper is strongly chitinized with coarse serration on the rim and an angular apex. The clasper of *G. choredon* is elongated, and the invagination between dorsal and ventral lobes is relatively narrow but deep (Fig. 41). The brachium subcostale has two spurs of unequal size, similar to the structure observed in *G. anthedon* but much more slender in construction (Fig. 43). The upper spur is directed towards the dorsal lobe and reaches the clasper rim dorsally of its apex. The dorsal lobe of the clasper is broad and has a rounded apex. The ventral lobe of the clasper is also broad and the serration on the rim is relatively fine but the serrate portion of the rim is raised from the line of the clasper rim. The clasper of *G. jugans* is rounded, with a deep, almost circular invagination between the lobes (Fig. 33). The brachium subcostale has two spurs of unequal size (Fig. 43). The major spur is directed towards the dorsal lobe and crosses the rim dorsally of its apex. The second spur originates from the main spur and not its base as in the other species that have this structure. The dorsal lobe of the clasper has a pointed, chitinized apex. The apex of the ventral lobe is produced as a dentate spur. The clasper of *G. sandawanum* is intermediate between *G. sarpedon* and *G. anthedon*. It is relatively elongated by extension of the ventral lobe, but this is not heavily chitinized (Page & Treadaway 2004). The brachium subcostale has two spurs of unequal size, as in *G. anthedon*, but the major spur is long and straight as in *G. sarpedon*.

The female genitalia of the *G. sarpedon* group (Fig. 44) conform to the general structure of *Graphium*. Thus, the ostium bursae opens, via a sclerotized, bilobed structure, into a cup-like vestibulum (Van Son 1949) closed dorsally by a canopy-like lamella postvaginalis (posterior labia of Smith & Vane-Wright 2001) presumed to derive from the 8th sternite (Miller 1987) and ventrally by the lamella antevaginalis formed from sclerotized ridges and a cartilaginous fold produced from the 7th tergite (lateral lobes of Smith & Vane-Wright 2001).

The female genitalia of *G. sarpedon* sensu stricto are difficult to analyse because of the highly cartilaginous inner structure of the organ. During the standard preparation using strong alkali, the cartilage absorbs water and swells up, resulting in considerable distortion and even extrusion of the internal structure of genital orifice. Thus, the preparation illustrated by Smith & Vane-Wright (2001) has undergone nearly complete eversion of the upper part of the vestibulum such that the lamella postvaginalis is not readily detectable, which led Smith & Vane-Wright

(2001) to describe it as a "simple ridge without clear homology to structures in other species of *Graphium*". PAGE & TREADAWAY (2004) illustrate a less distorted preparation in which the lamella postvaginalis is readily detected and clearly homologous to that found in other *Graphium*. Nevertheless, the structure surrounding the ostium bursae has partially swollen so that it protrudes significantly beyond the lamella antevaginalis. It is necessary to use rather dilute alkali and to monitor the progress of the digestion to avoid such distortion. In undistorted specimens, the lamella postvaginalis is domed and the rim has a small central lobe (Fig. 45). The margin of the lamella antevaginalis is smooth and weakly bilobed.

The female genitalia of *G. adonarensis* are similar to those of *G. sarpedon* but not so highly cartilaginous (and therefore not prone to the swelling usually observed with *G. sarpedon* specimens). The lamella postvaginalis is flatter than that of *G. sarpedon*, and there is no central lobe (Fig. 45). The margin of the lamella antevaginalis is slightly dentate and more strongly bilobed than that of *G. sarpedon*.

In *G. anthedon*, the lamella postvaginalis is very large but is only strongly chitinized along its ventral rim. The rim has a small central protrusion that weakly divides the rim into two lobes (Fig. 45). The lamella antevaginalis is strongly bilobed and is highly cartilaginous. On the outer surface, the two lobes are separated by a corrugated keel-like structure. Anterior to this latter structure is a pair of lateral folds that are strongly chitinized.

In *G. milon*, the lamella postvaginalis is very large and is strongly chitinized. The rim is smooth, without a central protrusion (Fig. 45). The lamella antevaginalis is strongly bilobed with the central keel marking a cleft between the lobes. The rim of the lobes is finely dentate and its surface is marked with corrugations. Anterior to this latter structure is a pair of lateral folds that are sclerotized, but not to the extent seen with *G. anthedon*.

In *G. isander*, the lamella postvaginalis is large, bilobed with a large central division and is only sclerotized along its rim (Fig. 45). The lamella antevaginalis is bilobed with a weakly represented central keel. The outer surface of this structure is more extensively corrugated than seen with other species.

In *G. choredon* the lamella postvaginalis is large, heavily chitinized and relatively flat (Figs. 44, 45). It has a central protrusion from the ventral rim. The lamella vaginalis is bilobed, with a marked central process and the whole structure is relatively strongly chitinized.

The female genitalia of *G. teredon* and *G. jugans* have not been examined. In *G. sandawanum*, the lamella postvaginalis is very large but is only strongly chitinized along its ventral rim as in *G. anthedon*. The rim has a small central protrusion this weakly divided into two lobes (PAGE & TREADAWAY 2004).

The differences in morphology of the male and female genitalia that exist between *G. sarpedon* and *G. adonarensis*, *G. anthedon* and *G. milon* and *G. isander* and *G. choredon* are more profound than observed between *Arisbe doson* (Felder & Felder, 1864) and *A. eurypylus* (Linnaeus, 1758), which differ in the shape of the harpe in the male genitalia and hardly at all in the female genitalia (PAGE & TREADAWAY 2004).

4 Sequence analysis

YAGI et al. (1999) and MAKITA et al. (2003) reported sequence fragments from the mitochondrial ND5 genes for a number of species of Leptocircini, including several isolates of *G. sarpedon* (from Japan, Malaysia and Taiwan), *G. adonarensis* from Bali (as *G. sarpedon*), *G. anthedon* (from Buru, as *G. milon*) and *G. milon* (from Sulawesi). MAKITA et al. (2003) described the results of phylogenetic analyses by clustering using neighbour-joining, or unweighted pair-group with arithmetic averages and by maximum parsimony analysis. They recognized two species, *G. sarpedon* and *G. milon*, with *G. adonarensis* (Bali) included in the *G. sarpedon* cluster but evidently less closely related to the other isolates. The topology of the trees constructed by either method was very similar to that shown in Fig. 46 for the BLAST analysis of the protein sequences. The isolates of *G. sarpedon* sensu stricto were highly homologous at the nucleotide level, differing not at all, or only in single nucleotide substitutions in the 381 base-pair fragment that was common to all sequences, as is typical for isolates representing different subspecies within the Leptocircini (MAKITA et al. 2003). The *G. adonarensis* sequence (AB059518) differed in six nucleotide substitutions from the consensus *G. sarpedon* sequence. This is more than typical for isolates representing different subspecies and is about the same degree of difference that is observed between the sequences of closely related pairs of species of Leptociricini. For example, *Arisbe bathycles* (Zinken, 1831) and *Arisbe chironides* (Honrath, 1884) differ by only four nucleotide substitutions, while isolates of *Arisbe doson* and *Arisbe eurypylus* differ by four to six nucleotide substitutions (MAKITA et al. 2003). The *G. anthedon* sequence (AB059528) differed in 14 nucleotide substitutions from the consensus *G. sarpedon* sequence and the *G. adonarensis* sequence. The *G. milon* sequence (AB059527) differed in 16 nucleotide substitutions from the consensus *G. sarpedon* sequence and in 17 nucleotide substitutions the *G. adonarensis* sequence. There was more similarity between the *G. anthedon* and *G. milon* sequences with 14 nucleotide differences. The difference between the nucleotide sequences of *G. sarpedon*, *G. anthedon* and *G. milon* are considerably greater than observed within any of the species of Leptocircini studied by MAKITA et al. (2003), and is about the same degree of difference as seen between distinct members of a species group, such as *Arisbe doson* and *A. evemon* (Boisduval, 1836) or *A. mandarinus* (Oberthür, 1879) and *A. tamerlanus* (Oberthür, 1876). At the protein level, which is more significant for the organism than the nucleotide sequences, *G. anthedon* differs from *G. milon* at only one position in the corresponding amino acid sequence, whereas both differ from all *G. sarpedon* isolates in conservative substitutions at three loci: position 17 (methionine in *G. sarpedon* isolates, leucine in *G. milon* & *G. anthedon*), position 235 (valine in *G. sarpedon* isolates, isoleucine in *G. milon* & *G. anthedon*), and position 236 (methionine in *G. sarpedon* isolates, valine in *G. milon* & *G. anthedon*). Thus, *G. anthedon* appears to be significantly more similar to *G. milon* than it is to *G. sarpedon*.

The nuclear 28S rRNA sequences analysed by MAKITA et al. (2003) revealed a similar pattern, with the topology of the phylogenetic trees being identical to the BLAST analysis (Fig. 47). The *G. sarpedon* isolates from Japan, Taiwan, Laos, and Malaysia had few, if any, substitutions. The sequence of the *G. adonarensis* isolate from Bali was somewhat less similar, being no more similar to *G. sarpedon* than was *G. milon* from Sulawesi.

In conclusion, the available nucleotide sequence data places *G. adonarensis* at approximately the same level of differentiation from *G. sarpedon* as one observes between established, closely related, pairs of species and places *G. anthedon* at approximately the same level of differentiation from *G. milon* as one observes between well-differentiated species within a species group.

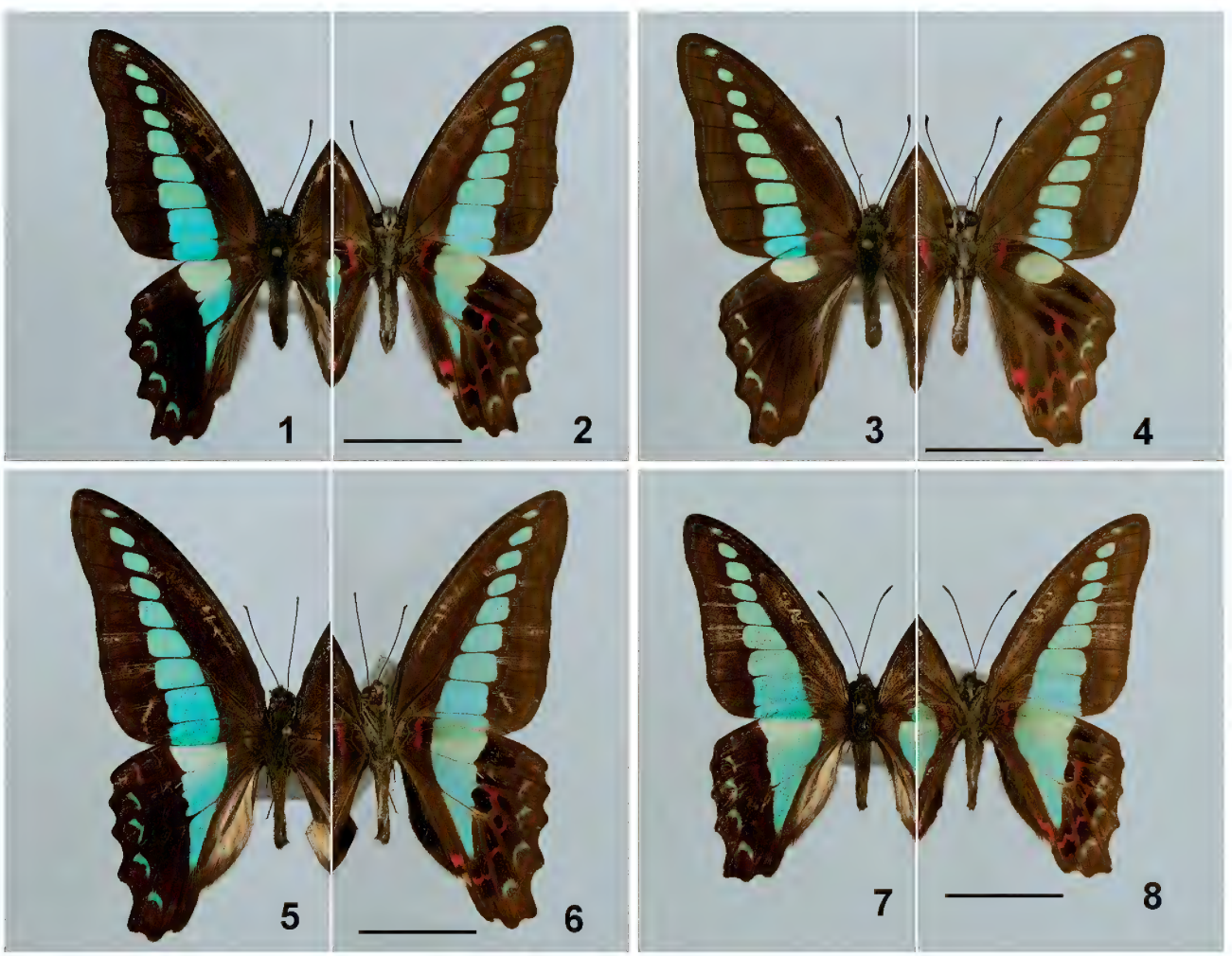
5 Taxonomy

5.1 *Graphium sarpedon* (Linnaeus, 1758)

Papilio Eques Trojanus sarpedon LINNAEUS, 1758. Type locality: Asia [China, Canton].

The type specimen and its origin were discussed by CORBET (1942) and TOXOPEUS (1951), who concurred that the authentic type is a specimen in the Linnaean cabinet originating from China and not, as suggested by AURIVILLIUS (1882), a specimen in the collection of Queen Louisa Ulrica of Sweden. The origin of the latter specimen may also be China (TOXOPEUS 1951), although it was assumed to be Java by ROTHSCHILD (1895) because of its similarity to Javanese specimens (AURIVILLIUS 1882). The lectotype in the Linnaean collection was designated by HONEY & SCOBLE (2001). HEMMING (1935) placed *Papilio protensor* Gistel, 1857, as a junior synonym of *P. sarpedon* Linnaeus, 1758.

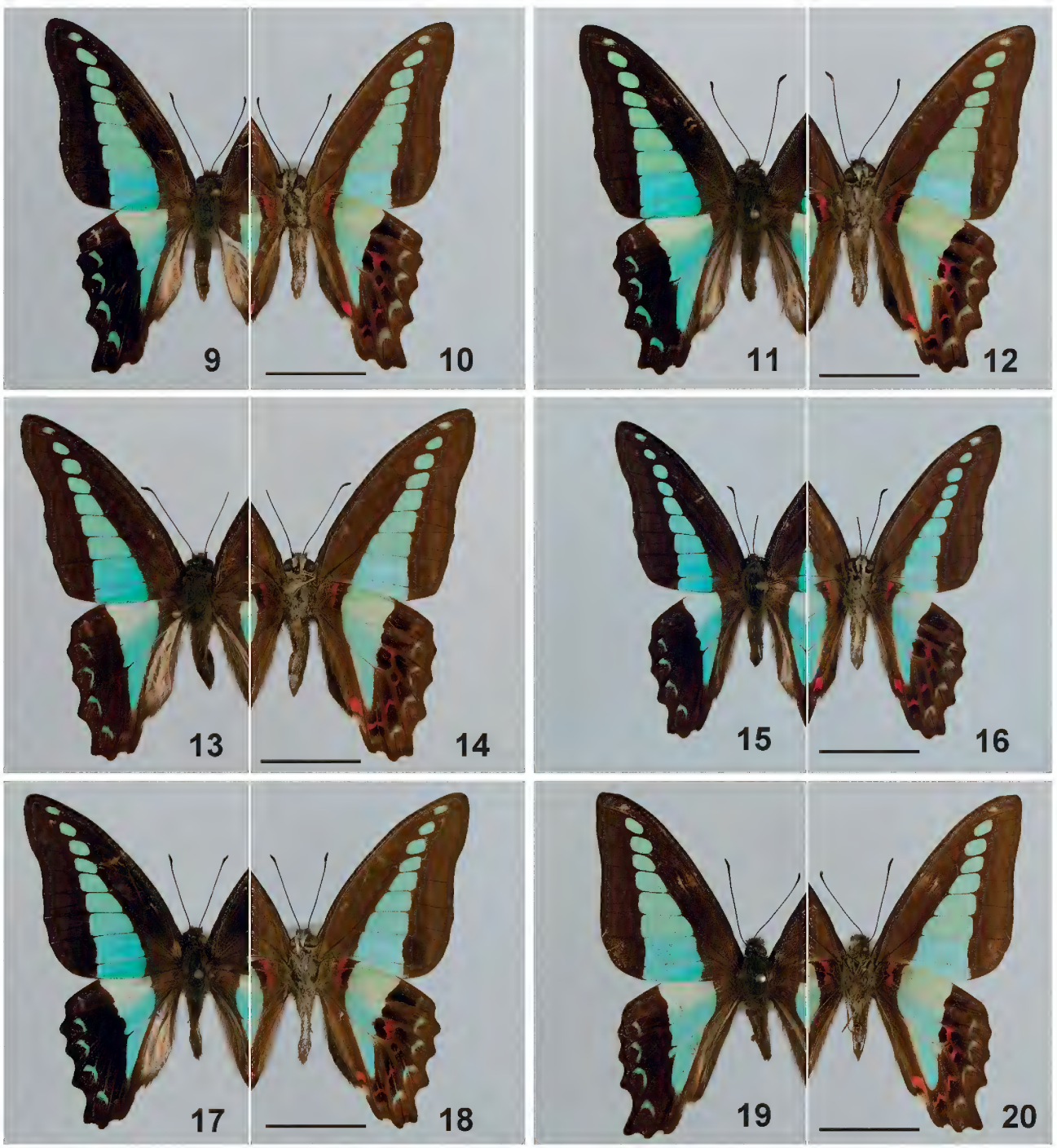
G. s. sarpedon (Figs. 1, 2) has a single band of green markings on both surfaces of the forewing that starts at the costal margin close to the apex of the cell and extends through the discal area to the anal margin. The apical four green markings are isolated round spots but the markings are more extensive in cells CuA2 to M3. In the typical form, the veins separating these cells are marked with black, breaking the discal band into discrete rectangular spots. The hindwing upperside has a tapered discal band that is white at the costal margin and green towards the anal tornus of the wing. There is also a sub-marginal band of green (or white) spots. The markings on the underside of the wings resemble those on the upperside except that the



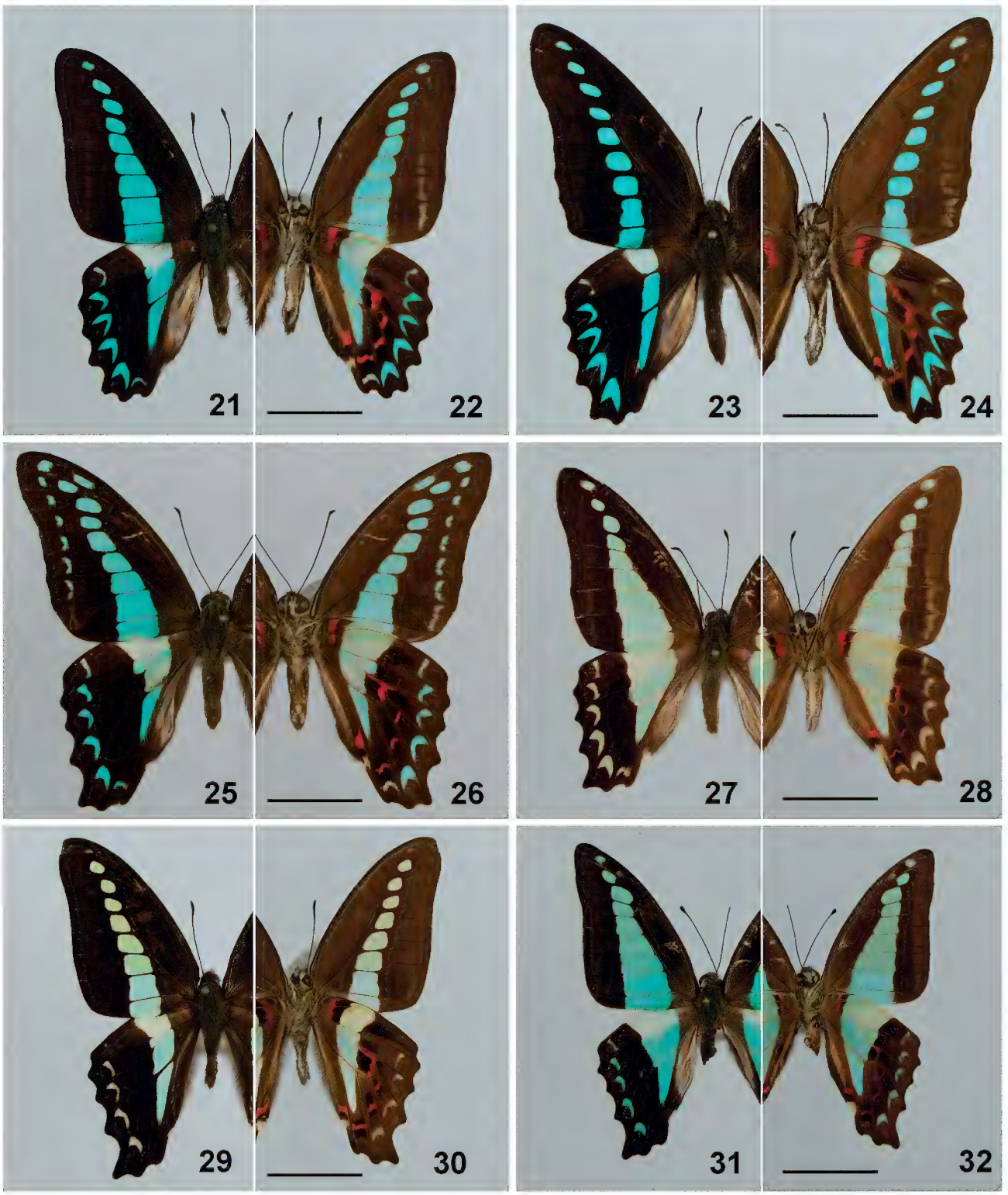
Figs. 1–8. Males of *Graphium sarpedon*. – **1**. *G. s. sarpedon* (Linnaeus, 1758), China, typical form. **2**. Same specimen as before, underside. **3**. *G. s. sarpedon*, f. *semifasciatus*, China. **4**. Same specimen as before, underside. **5**. *G. s. sirkari* n. subsp. Holotype, N. India. **6**. Same specimen as before, underside. **7**. *G. s. sirkari* Paratype, N. India, early season form. **8**. Same specimen as before, underside. – Scales: 2 cm.

green areas are covered with a layer of opalescent scales on both wings and that there is a discal band of red spots lying between the green markings of the discal band and the submarginal row of spots.

Distribution of the species: China, Indonesia (Kalimantan), Japan, Malaysia, Philippines, Taiwan.



Figs. 9–20. Males of *Graphium adonarensis*. – **9**. *G. a. adonarensis* (Rothschild, 1896), Sumbawa. **10**. Same specimen as before, underside. **11**. *G. a. hundertmarki* n. subsp. Holotype, Bali. **12**. Same specimen as before, underside. **13**. *G. a. agusyantoei* n. subsp. Holotype, Sumatra. **14**. Same specimen as before, underside. **15**. *G. a. phyrisoides* n. subsp. Holotype, Belitung. **16**. Same specimen as before, underside. **17**. *G. a. toxopei* n. subsp Holotype, Lombok. **18**. Same specimen as before, underside. **19**. *G. a. septentrionicolus* n. subsp Holotype, N. India. **20**. Same specimen as before, underside. – Scales: 2 cm.



Figs. 21–32. Males of *Graphium anthedon*, *G. milon*, *G. isander*, *G. choredon*, *G. teredon* and *G. jugans*. – **21**. *G. a. anthedon* (Felder & Felder, 1864), Seram. **22**. Same specimen as before, underside. **23**. *G. m. milon* (Felder & Felder, 1865), Sulawesi. **24**. Same specimen as before, underside. **25**. *G. i. isander* (Godman & Salvin, 1888), Guadalcanal. **26**. Same specimen as before, underside. **27**. *G. choredon* (Felder & Felder, 1864), Australia. **28**. Same specimen as before, underside. **29**. *G. teredon* (Felder & Felder, 1864), Sri Lanka. **30**. Same specimen as before, underside. **31**. *G. j. wetterensis* Okano, 1993, Wetar. **32**. Same specimen as before, underside. – Scales: 2 cm.

Graphium sarpedon sarpedon (Linnaeus, 1758)

= *Papilio protensor* Gistel, 1857. Type locality: probably China. [Synonym].
= *Papilio semifasciatus* Honrath, 1888. Type locality: Kiukiang, China. [Synonym].

Material examined

Type material: Lectotype ♂ *Papilio sarpedon* Linnaeus, 1758 [LSLO]; Holotype ♂* *Papilio semifasciatus* Honrath, 1888 [BMNH]. – Additional material: 4♂♂ Hong Kong [CGT]; 61♂♂ from China (Anhui, Hubei, Fujian, Guangxi, Sichuan, Yunnan provinces and Hong Kong, 6♀♀ from Anhui and Sichuan provinces, China [MGP].

Diagnostic characters

A moderately sized subspecies with the range in ♂ FW length 34–42 mm in early season and 40–48 mm in the late season. It shows some variation in size across its range and between seasons. Specimens from the northern part of the range are smaller (Anhui, June–July, average ♂ FW length 41.7 mm, N = 23) than those from the southern part of the range (Fujian, June–July, average ♂ FW length 44.8 mm, N = 11). The early season ("Spring") forms are smaller than those of the late season ("Summer") brood (Sichuan, April–May, average ♂ FW length 37.4 mm, N = 6, compared to July–August average ♂ FW length 45.5 mm, N = 6). The early season forms have complete bands of green spots on the uppersides of both wings. The spots towards the anal margin of the forewing are scarcely separated by black marking along the veins. The hindwing discocellular CuA1 is constantly marked by heavy black scaling. The late season specimens have the FW spots separated by black scaling along the veins (Fig. 1). The black marking along the HW discocellular shows a tendency to be enlarged across the discal cell leading to reduction of the tapering discal band green markings, which may be reduced to a single spot in cell Sc+R1 (Fig. 3). These examples with reduced markings (= *semifasciatus* Honrath 1888) were identified as being extreme wet season forms by Toxopeus (1951). The type specimen has a complete discal band on the hindwing and was suggested to be a normal summer form.

Distribution

Distributed throughout most central and southern China, with the exception of Hainan and those parts of southern Yunnan bordering onto Myanmar and Laos.

Graphium sarpedon nipponus (Fruhstorfer, 1903)

Papilio sarpedon nipponus Fruhstorfer, 1903. Type locality: In original description: Okinawa, Ishigaki, Nagasaki; later restricted to Nagasaki (Fruhstorfer 1908).
= *Papilio sarpedon sarpedonides* Fruhstorfer 1908. Type locality: Oshima. [Synonym].
= *Papilio sarpedon intermedium* Kato, 1940. Type locality: Hachijo Is. [Homonym, nec. *Papilio intermedia* Stichel, 1910].
= *Papilio sarpedon hachijoinsulanum* Kato, 1942. Replacement name for *intermedium* Kato, 1940. [Synonym].

Material examined

Type material: Syntype ♂ *Papilio sarpedon sarpedonides* [BMNH]. – Additional material: 3♂♂, 1♀ [CGT], 8♂♂, 5♀♀ [MGP] from various localities on Honshu Island, Japan.

Diagnostic characters

A relatively large subspecies: average ♂ FW length 45.7 mm in the early season, to 46.7 mm in late season. The discal band of green spots on the upperside of the wings is narrow, with most spots of the FW being separated by black lines along the veins. Specimens from Korea are traditionally included under this subspecies, but examination of museum and photographic material suggests this needs further investigation. Both seasonal forms from Korea appear to have consistently broader green discal bands, with the veins not heavily marked with black. The difference between the late summer forms is strongest.

Distribution

Japan (Honshu, Kyushu, Shikoku, Hachijo), Korea.

Graphium sarpedon connectens (Fruhstorfer, 1908)

Papilio sarpedon connectens Fruhstorfer, 1908. Type locality: Formosa.
= *Papilio sarpedon surusumi* Matsumura, 1909. Type locality: Formosa. [Synonym].

Material examined

Type material: Syntype ♂ [BMNH]. – Additional material: 4♂♂ [CGT], 5♂♂, 4♀♀ [MGP] from Taiwan.

Diagnostic characters

A small subspecies: average ♂ FW length 41.1, females slightly larger. There is no detectable seasonal variation. Similar in phenotype to *G. s. nipponus*, but with heavier black markings along the veins of the forewing.

Distribution

Taiwan.

Graphium sarpedon luctatius (Fruhstorfer, 1907)

Papilio sarpedon luctatius Fruhstorfer, 1907. Type locality: in the original description syntypes were listed from Natuna (Borneo, Singapore, Malay Peninsula). The syntype held in the BMNH labelled as a "Type" is from North Borneo.

= *Papilio sarpedon melas* FRUHSTORFER, 1907. Type locality: In original description: Tonkin and Tenasserim. "Type" in BMNH: Chiem-Hoa, C. Tonkin. [Homonym, nec. *Papilio melas* Herbst, 1796].

= *Graphium sarpedon corbeti* TOXOPEUS, 1951. Proposed as a replacement name for *Papilio sarpedon melas* Fruhstorfer, 1907. [**n. syn.**].

Material examined

Type material: Syntypes *Papilio sarpedon luctatius* Fruhstorfer, 1907 (♂*), *Papilio sarpedon melas* Fruhstorfer, 1907 (♂*) [BMNH]. – Additional material: 10♂♂ from Malaysia, Thailand and Indonesia (Kalimantan including Karimata island) [CGT]; 44♂♂ from Cambodia, China (Hainan), Indonesia (Kalimantan, including Karimata and Natuna Islands), Laos, Malaysia (including Balambangan and Banggi islands), Singapore, Thailand, and Vietnam, 18♀♀ from Indonesia (Kalimantan), Laos, Malaysia, Thailand, and Vietnam [MGP].

Diagnostic characters

This is a small subspecies with a range in ♂ FW length of 36–46 mm (average ♂ FW length 41.9 mm). There is some variation in size across its range, with specimens from eastern Thailand, Laos, Vietnam and Hainan tending to be a bit larger (average ♂ FW length 42.8 mm) than those from southern Thailand, Malaysia and Indonesia (average ♂ FW length 41.3 mm). Very small specimens (♂ FW length < 36 mm) with sharply pointed wings and narrow green markings on both sets of wings occur in all parts of the range. These do not, however, appear to correspond to seasonal forms, as they may occur at different times of the year. The markings do not vary greatly over the range, except that a few specimens from N. Vietnam and Hainan have the HW discocellular marked with black as it traverses the green discal band, as is usual in *G. s. sarpedon* spring form. This suggests there may be some introgression of genes from southern China into the Vietnamese and Hainan populations of *luctatius*.

TOXOPEUS (1951) proposed the replacement name for *melas* Fruhstorfer, 1908 because this name is preoccupied by *Papilio melas* Herbst 1796. He assumed that *melas* Fruhstorfer, 1908 was the wet season form of *G. sarpedon* Linnaeus, 1758 to be found in Sikkim as well as Tonkin (= Vietnam) and Tenasserim (= Myanamar). However, the description of *melas* Fruhst. reads thus: "Die Flügel werden noch schmaler und spitzer als bei *luctatius*, die Hinterflügelbinde verengt sich mehr, und fast alle Flecke der Vorderflügel stehen durch breiten schwarzen Aderbezug weit getrennt. Uebergang zu *semifasciatus* Honr. von China. Patria: Tonkin, Juni bis September; Tenasserim, Mai". In describing specimens that have narrower and more pointed wings than *G. s. luctatius* Fruhstorfer, 1907 and a narrow discal band with well-separated spots, FRUHSTORFER (1907) was describing a different butterfly to the wet season form of *G. sarpedon* found in Sikkim, which is a significantly larger form than *G. s. luctatius*, and has rounded forewings. The description by FRUHSTORFER corresponds to specimens found sporadically within the range of *G. s. luctatius* and we therefore place *G. s. corbeti* Toxopeus, 1951 as a synonym of *G. s. luctatius* Fruhstorfer, 1907.

Distribution

Cambodia, China (southern Guangdong and Guanxi: Hainan), Indonesia (Kalimantan, Kep. Natuna, Kep. Pul. Karimata), Laos, Malaysia, Singapore, Thailand, Vietnam.

Graphium sarpedon colus (Fruhstorfer, 1907) **stat. rev.**

Papilio sarpedon colus FRUHSTORFER, 1907. Type locality: Palawan.

Material examined

Type material: Syntype ♂* [BMNH]. – Additional material: 11♂♂, 1♀ [CGT], 55♂♂, 12♀♀ [MGP] from Palawan and Balabac.

Diagnostic characters

This is a moderately sized subspecies, with average ♂ FW length 42.1 mm, lacking significant seasonal variation. In the discal band of green spots on the FW upperside, the spot in cell M1 is characteristically enlarged relative to those in the cells above and below.

PAGE & TREADAWAY (2003) treated this population as belonging to *G. s. sarpedon*. However, after examining a larger number of specimens from China and the Philippines, including Palawan, it is clear that there are consistent differences that warrant treating the populations on Palawan and Balabac as a separate subspecies, for which the name *colus* Fruhstorfer, 1907 is available. Melanic specimens, in which part or even all of the green markings are absent (PAGE & TREADAWAY 2003), seem to be more frequent in the Palawan population than in any other race.

Distribution

Philippines (Balabac, Palawan).

Graphium sarpedon pagus (Fruhstorfer, 1907) **stat. rev.**

Papilio sarpedon pagus FRUHSTORFER, 1907. Type locality: Philippinen Bazilan, Mindoro.

Material examined

Type material: Syntype ♂* from Philippinen, Bazilan [BMNH]. – Additional material: 31♂♂, 7♀♀ [CGT], 151♂♂, 23♀♀ [MGP] from Bohol, Catanduanes, Cebu, Leyte, Luzon, Marinduque, Mindanao, Mindoro, Negros, Panay, Polillo, Samar, Siasi, Sibuyan, Tawi Tawi group (including Sibutu and Sanga Sanga).

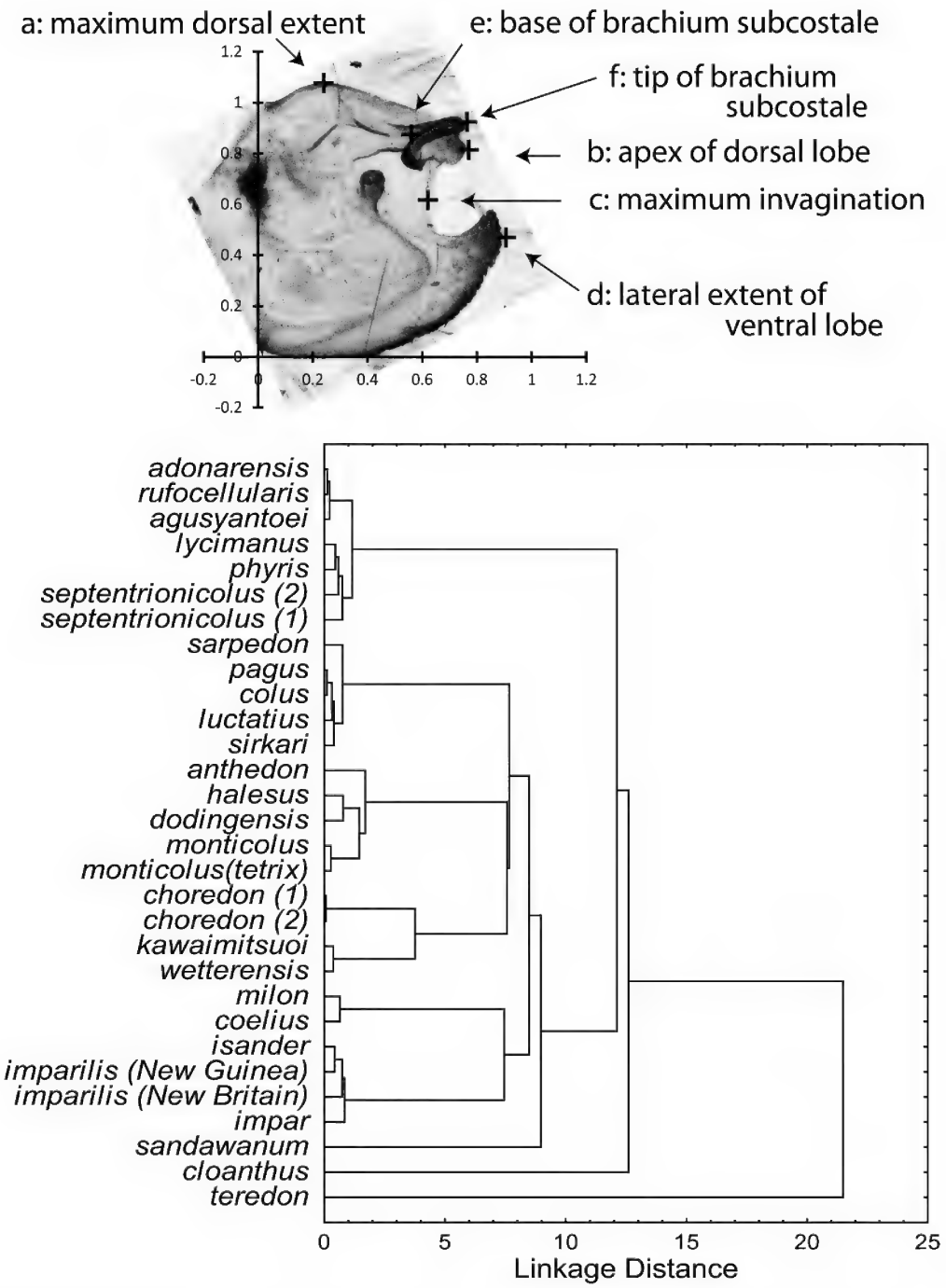
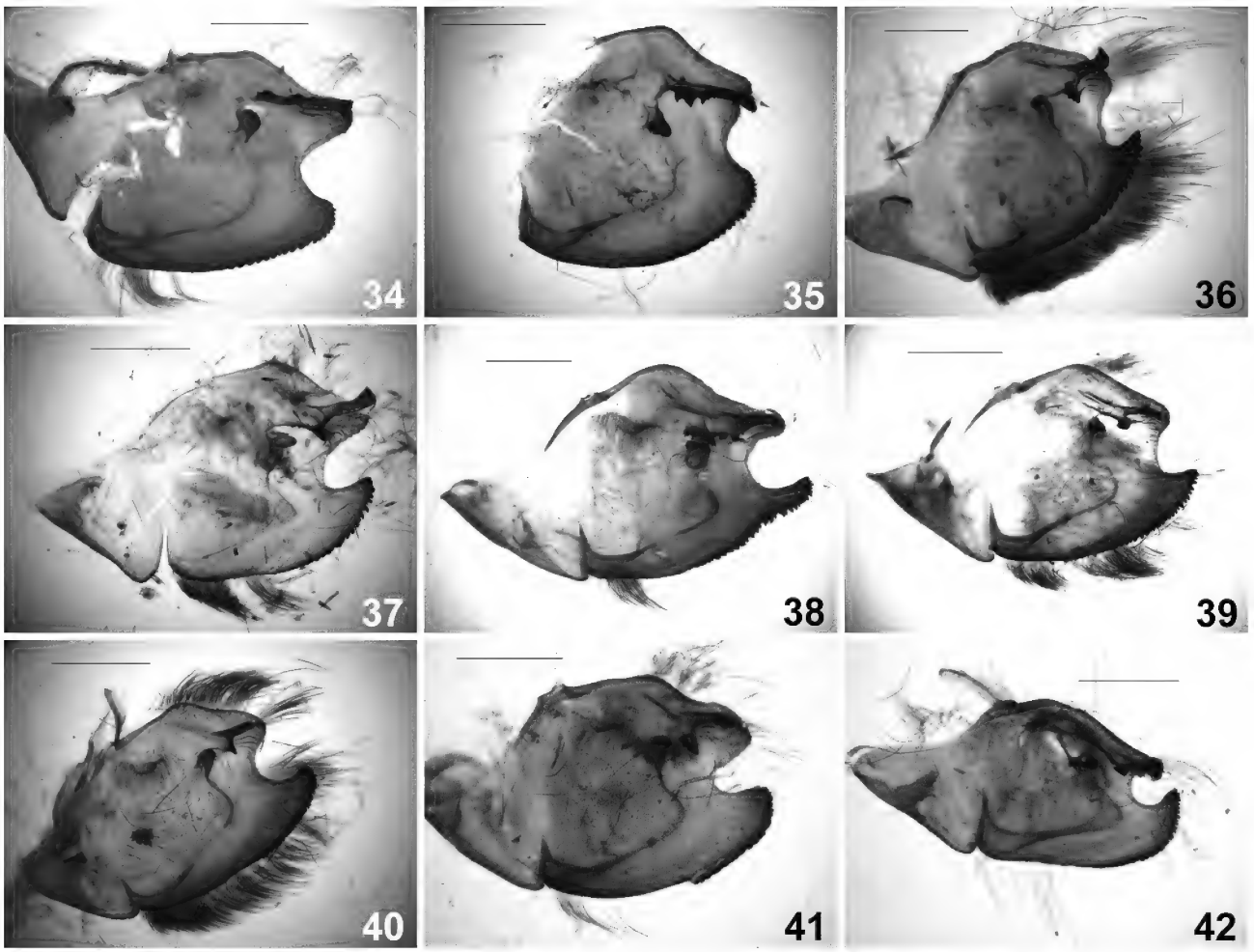


Fig. 33. Morphometric analysis of the male genitalia of the *Graphium sarpedon* species group. – The clasper of *G. jugans wetterensis* is shown aligned in the coordinate system used for morphometric analysis with the measurement points marked. A neighbouring group linkage diagram using squared euclidean distances is shown for representative samples of the prinicipal taxa.

Diagnostic characters

This is a large subspecies, with average ♂ FW length 44.4 mm, that does not display significant seasonal variation. The discal band of green spots on the FW upperside is narrower than in *G. s. sarpedon* and neither the veins near the FW anal margin nor the HW discocellular vein are lined with black.

As remarked above, Page & Treadaway (2003) treated the Philippines population as belonging to *G. s. sarpedon*, but this arrangement is not supported by more extensive



Figs. 34–42. Male claspers of *Graphium* spp. – **34**. *G. sarpedon sarpedon* (Linnaeus, 1758), China. **35**. *G. adonarensis adonarensis* (Rothschild, 1896), Sumbawa. **36**. *G. anthedon anthedon* (Felder & Felder, 1864), Seram. **37**. *G. anthedon monticolus* (Fruhstorfer, 1896), Sulawesi. **38**. *G. milon milon* (Felder & Felder, 1865), Sulawesi. **39**. *G. isander isander* (Godman & Salvin, 1888), Guadalcanal. **40**. *G. isander imparilis* (Rothschild, 1895), Papua New Guinea. **41**. *G. choredon* (Felder & Felder, 1864), Australia. **42**. *G. teredon* (Felder & Felder, 1864), Sri Lanka. – Scales: 1 mm.

studies, including series from multiple locations within the Philippines. It is now clear that the population of the greater part of the Philippines should be referred to a separate subspecies, for which the name *pagus* Fruhstorfer, 1907 is available. Despite the wide range of climatic conditions in the Philippines, this subspecies shows little or no variation over most of its range or through the seasons (Treadaway & Schröder 2012). The exception may be in the small islands lying at the end of the Sulu archipelago, close to Borneo. We have examined 1 ♂ from Sibutu and 1 ♂, 1 ♀ from Sanga Sanga, in the Tawi Tawi group, which all have a markedly narrower green discal band, with the veins strongly marked with black, unlike the specimens from Tawi Tawi Island itself, which are typical of *G. s. pagus* Fruhstorfer, 1907. The status of the population of this small island group needs further investigation.

Distribution

Philippines, except Balabac and Palawan.

Graphium sarpedon morius (Fruhstorfer, 1908) **stat. rev.**

Papilio sarpedon morius Fruhstorfer, 1908. Type locality: Ishigaki Is.

Material examined

Type material: Syntypes (♂*, ♀*) [BMNH]. – Additional material: 5 ♂♂, 2 ♀♀ Iriamote and Ishigaki Islands [MGP].

Diagnostic characters

Intermediate in size between *G. s. connectens* and *G. s. nipponus* (average ♂ FW length 44.0 mm). The green

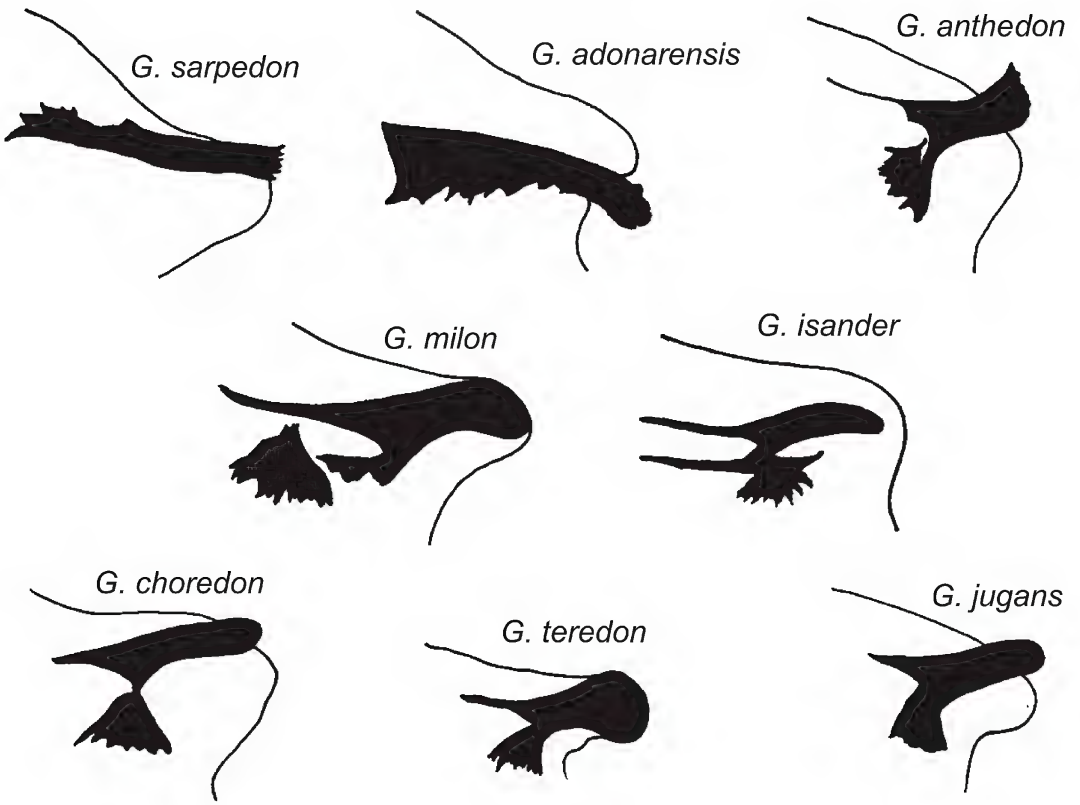


Fig. 43. Diagrams showing the outline of the brachium costale and apex of the dorsal lobe of *Graphium sarpedon* species group members.

discal band of spots is narrower than in *G. s. nipponus* and the FW spots are well separated by black along the veins, as in *G. s. connectens*.

Racheli & Cotton (2009) placed *G. s. morius* as a synonym of *G. s. nipponus* Fruhstorfer, 1903, but this is not correct. The Yaeyama Islands population is intermediate between *G. s. nipponus* from Honshu and *G. s. connectens* from Taiwan.

Distribution

Japan (Yaeyama Islands [Iriomote-jima, Ishigaki-jima]).

Graphium sarpedon sirkari **n. subsp.**

= *Papilio (Graphium) sarpedon corbeti* f. *gemmatus* Toxopeus, 1951. Type locality: Sikkim. "Trockenzeit" (form name).

Holotype: ♂, Shillong, Khasi Hills, Assam, N. India, April–June 1968, leg. S. K. Sirkar [SMF]. FW length 44.0 mm. (Fig. 5, Fig. 6 underside).

Paratypes: 38♂♂ Assam, N. India April–June 1968, leg. S. K. Sirkar [CGT]; 1♂ Nowgong Assam, N. India, 7 April 1949 [CGT]; 1♂ Khasi Hills, Assam, India 9 July 1956 [CGT]; 1♂ Jowai, Assam, N. India, 28 April 1966 [CGT]; 1♂ Shillong, Khasi Hills, N. India, May 1965, leg. S. K. Sirkar [CGT]; 1♂ Mengsu, S. W. Yunnan, May 1968 [CGT]; 35♂♂ Khasi Hills, N. India, April–June 1968, leg. S. K. Sirkar [MGP]; 6♂♂ Khasi Hills, Meghalaya, India, 1300 m, 10 July 2001 [MGP]; 1♂ Donggan, Mengallan, S. W. Yunnan, China, July 2008 [MGP]; 2♂♂ Donggan, Mengallan, S. W. Yunnan, China, April 1999 [MGP]; 1♂ Dongchuan, N. E. Yunnan, China, July 2008 [MGP]; 8♂♂ Ping Bian (Geiju), Yunnan, China, 900–1200 m, 21 June–17 July 1996, leg. R. Westphal [MGP]; 10♂♂ Yunnan, China, July 2008 [MGP]; 1♂ Chudu Razi Hills, 30 miles east of Kawnglaghpa, Kachin State, Burma, 23 June 2005 [MGP]; 1♂ Chudu Razi Hills, 30 miles east of Kawnglaghpa, Kachin State, Burma, 15 July 2005 [MGP]; 1♂ Chudu Razi Hills, 30 miles east of Kawnglaghpa, Kachin State, Burma, 18 July 2005 [MGP]; 1♂ Chudu Razi Hills, 30 miles east of Kawnglaghpa, Kachin State, Burma, 20 July 2005[MGP].

Derivatio nominis

This subspecies is named after the collector S. K. Sirkar.

Diagnostic characters

A relatively large subspecies with the range in ♂ FW length 35–43 mm (average 38.7 mm) in early season and 41–50 mm (average 44.8 mm) in the late season. It is

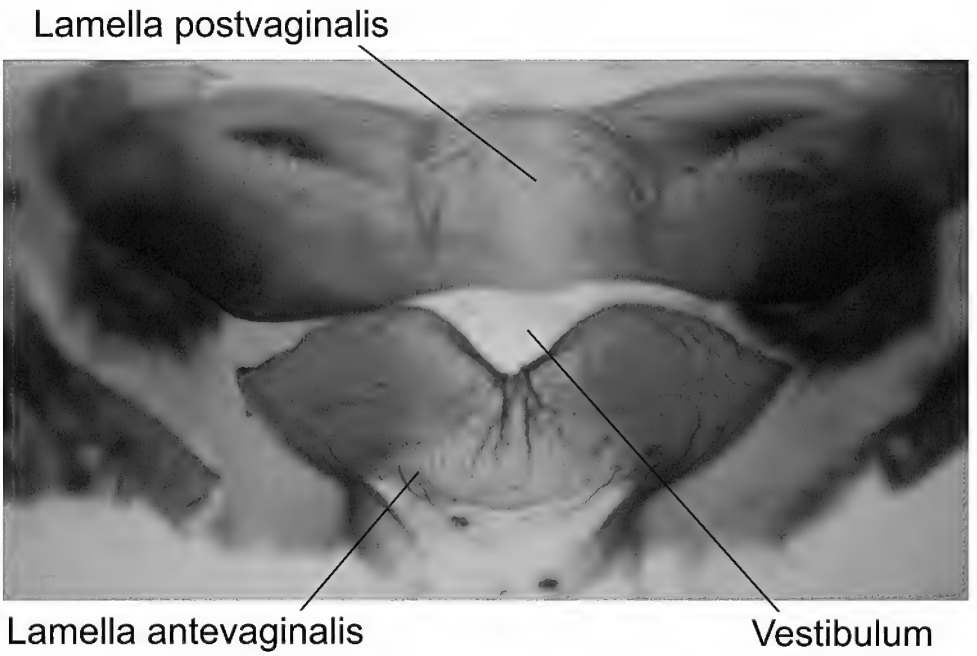


Fig. 44. External morphology of the female genitalia of *Graphium choredon*.

clearly larger than the neighbouring *G. s. luctatius* Fruhstorfer 1758 (average late season ♂ FW length 41.5 mm), under which name it has sometimes been treated. The green spots in the upperside discal bands towards the anal margin of the forewing are scarcely separated by white (or black, particularly in the late season form) marking along the veins. The tapering discal band of the HW is entire, with the discocellular CuA1 marked with a fine black line, if at all. The early season form (Figs. 7, 8) has broader discal bands on both sets of wings than does the late season form.

Distribution

China (S. W. Yunnan), India (Northern provinces), Myanmar (Kachin State).

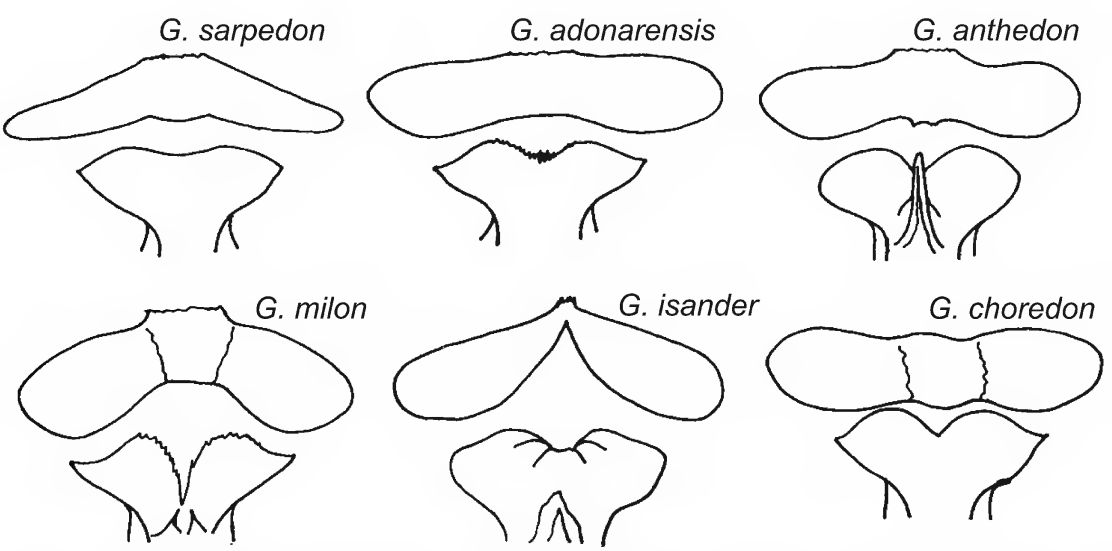


Fig. 45. Diagrams showing the outlines of the lamella postvaginalis and lamella antevaginalis of *Graphium sarpedon* species group members.

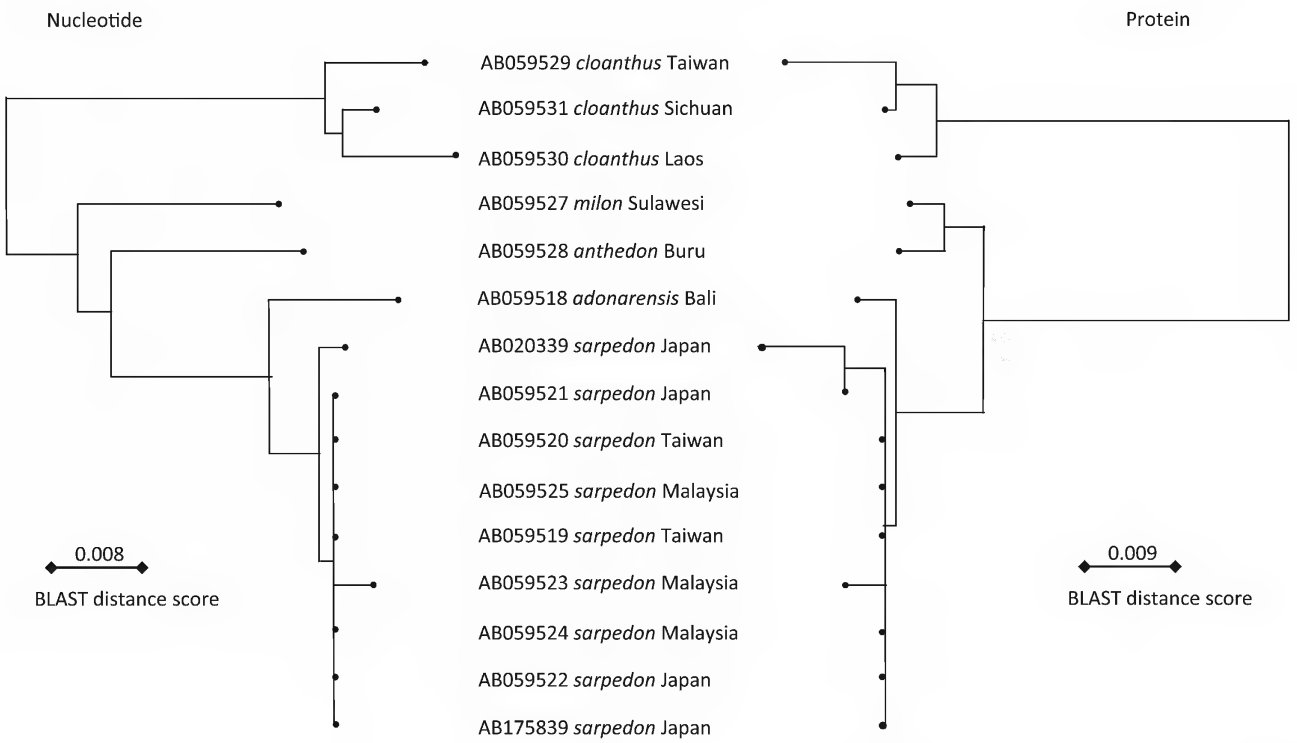


Fig. 46. Distance tree diagram from BLAST showing homology between ND5 nucleotide and translated protein sequences of *Graphium cloanthus*, *G. anthedon*, *G. milon*, *G. adonarensis* and *G. sarpedon* isolates.

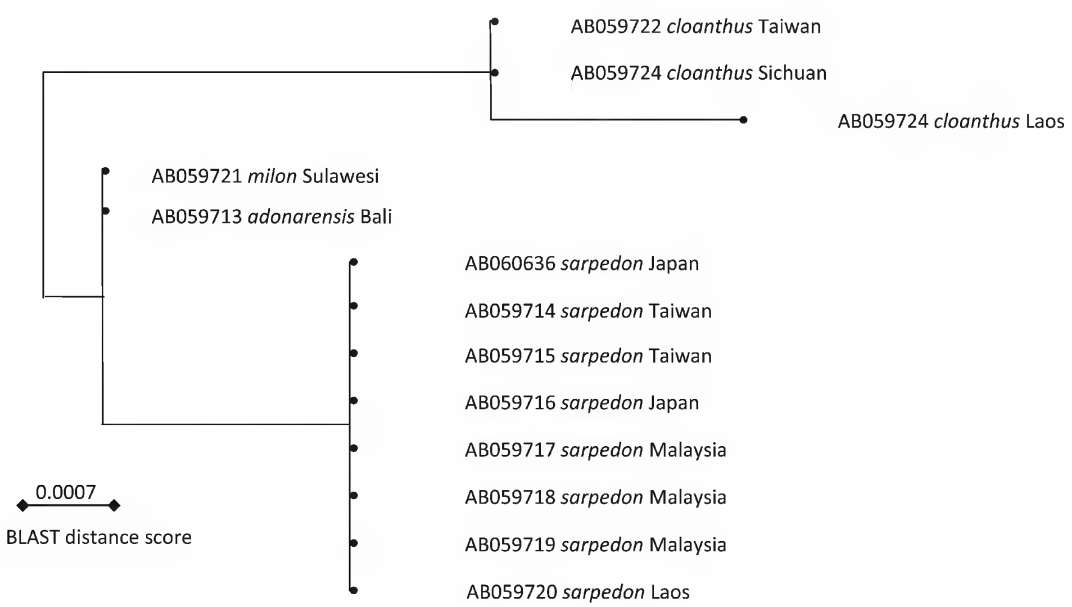


Fig. 47. Distance tree diagram from BLAST showing homology between 28S rRNA nucleotide sequences of *Graphium cloanthus*, *G. milon*, *G. adonarensis* and *G. sarpedon* isolates.

5.2 *Graphium adonarensis* (Rothschild, 1896) **stat. rev.**

Papilio sarpedon adonarensis ROTHSCHILD, 1896. Type locality: Adonara.

The discal band is broader than in *G. s. sarpedon* and the markings in cells CuA2 and CuA1 are not usually separated by broad black lines along the veins (Fig. 9). Instead these veins are often dusted with white scales. There are significant differences in the anatomy of the male and female genitalia (see section 4 above).

Distribution of the species: China (Fujian, Hubei), India (Meghalaya), Indonesia.

Graphium adonarensis adonarensis (Rothschild, 1896)

Material examined

Type material: Holotype ♂ [BMNH]. – Additional material: 5♂♂ Sumbawa, 5♂♂ Flores, 1♂ Adonara [MGP].

Diagnostic characters

Small (average ♂ FW length 41.6 mm), with sharply pointed FW and narrow, elongated HW, produced to a small, sharply pointed tail at M3. The discal band of green spots is relatively broad at the anal margin of the FW and the veins traversing it are marked with white. Only the apical 3–4 spots of the band are separated by black.

Distribution

Indonesia (Sumbawa, Flores, Adonara).

Graphium adonarensis rufofervidus (Fruhstorfer, 1897) **n. comb.**

Papilio sarpedon rufofervidus FRUHSTORFER, 1897. Type locality: Nias.

Material examined

Type material: Syntype ♂ [BMNH]. – Additional material: 1♂ Nias [MGP].

Diagnostic characters

Similar to *G. a. adonarensis*, except that the red spots of the HW underside are greatly enlarged.

Distribution

Indonesia (Nias).

Graphium adonarensis rufocellularis (Fruhstorfer, 1905) **n. comb.**

Papilio sarpedon rufocellularis FRUHSTORFER, 1905. Type locality: Bawean.

Material examined

Type material: Syntype ♂ [BMNH]. – Additional material: 1♂, 1♀ Bawean [MGP].

Diagnostic characters

Larger than *G. a. adonarensis* (FW length 44.1 and 45.6 for ♂ and ♀, respectively). The green discal band of the upperside is narrower and most of the spots on the FW are separated by black markings along the veins. The red spots of the HW underside are greatly enlarged.

Distribution

Indonesia (Bawean).

Graphium adonarensis phyris (Jordan, 1937) **n. comb.**

Papilio sarpedon phyris JORDAN, 1937. Type locality: Sipora.

Material examined

Type material: Holotype ♂ [BMNH]. – Additional material: 3♂♂ Sipora, 1♂ Pagai [MGP].

Diagnostic characters

Smaller than *G. a. adonarensis* (average FW length 40.1 mm). The green discal band of the upperside is narrow and most of the spots on the FW are separated by black markings along the veins. Only those towards the anal margin of the wing are confluent: vein CuA2 is marked with white.

Distribution

Indonesia (Sipora, Pagai).

Graphium adonarensis lycianus (Toxopeus, 1951) **n. comb.**

Papilio sarpedon lycianus TOXOPEUS, 1951. Type locality: Java.

Material examined

5♂♂, 2♀♀ [CGT], 6♂♂, 1♀ [MGP] from Java.

Diagnostic characters

Smaller than *G. a. adonarensis* (average FW length 40.8 mm). The green discal band of the upperside is broader than *G. a. adonarensis* and only the apical three spots on the FW are separated by black. The veins CuA2 to M3 are marked with white.

Distribution

Indonesia (Java).

Graphium adonarensis hundertmarki **n. subsp.**

Holotype: ♂, Bedegul, Bali, Indonesia, April 2003, leg. H. Agusyanto [SMF]. FW length 41.4 mm. (Fig. 11, Fig. 12 underside).

Paratypes: 1 ♂ Den Pasar, Bali, Indonesia, 6 April 1958, leg. C. G. Treadaway [CGT]; 4 ♂♂ Bali, Indonesia, April 2003, leg. H. Agusyanto [MGP]; 1 ♂ Bedegul, Bali, Indonesia, April 2003, leg. H. Agusyanto [MGP]; 1 ♂ Bali, Indonesia, October 2007, leg. M. Page [MGP]; 1 ♂ Bali, Indonesia, October 2002, leg. H. Agusyanto [MGP]; 1 ♂ Bali, Indonesia, November 2002, leg. H. Agusyanto [MGP]; 6 ♂♂ Bali, Indonesia, December 2002, leg. H. Agusyanto [MGP]; 1 ♀ Gilimanuk, Bali, Indonesia, December 2002, leg. H. Agusyanto [MGP].

Derivatio nominis

This subspecies is named after B. Hundertmark, an enthusiastic student of the butterflies of Bali, in recognition of his help while exploring the island, and other parts of Indonesia.

Diagnostic characters

Larger than *G. a. adonarensis*, with more rounded FW and less elongated HW. The tail on M3 is not so pronounced. The green discal band is broader on both wings than that of *G. a. adonarensis* or even *G. a. lycianus*. The wing shape is similar to that of *G. a. lycianus*, but the forewing is broader with a more convex distal margin.

The paratype males agree well with the holotype (average FW length 39.4 mm, range 37.1–41.9 mm), except that those from October through to December tend to have narrower green discal bands than those from April, or *G. a. lycianus*. The single female, caught in December, is large (FW length 45.8 mm) and a pale form. The discal band is narrow, as in the contemporary males and is narrower than observed with females of *G. a. lycianus*.

Distribution

Indonesia (Bali).

Graphium adonarensis agusyantoei **n. subsp.**

Holotype: ♂, Aceh, Sumatra, Indonesia, December 1997, leg. H. Agusyanto [SMF]. FW length 43.5 mm. (Fig. 13, Fig. 14 underside).

Paratypes: 4 ♂♂ Same data as holotype [MGP]; 1 ♂ Brastagi, Sumatra, Indonesia, June 2008, leg. M. Page [MGP]; 3 ♂♂, 1 ♀ Mt Dempo, Sumatra, Indonesia, July 2008, leg. M. Page [MGP].

Derivatio nominis

This subspecies is named after H. Agusyanto for his considerable help in providing information and with obtaining some of this material.

Diagnostic characters

Larger than *G. a. adonarensis*, with more rounded FW and less elongated HW. The tail on M3 is scarcely produced. The green discal band is broader on both wings than that of *G. a. adonarensis* but not as broad as in *G. a. lycianus*. The wing shape is similar to that of *G. a. lycianus*, except that the hindwing margin is more regular.

The paratype males agree well with the holotype (average FW length 41.2 mm, range 40.1–43.6 mm). The single female is similar in size to the males (FW length 40.4 mm). The discal band is narrow, as in the males and is narrower than observed with females of *G. a. lycianus*.

Distribution

Indonesia (Sumatra).

Graphium adonarensis phyrisoides **n. subsp.**

Holotype: ♂, Belitung, Indonesia, September 2008, leg. M. Page [SMF]. FW length 37.1 mm. (Fig. 15, Fig. 16 underside).

Paratypes: 1 ♀ lower slopes of Mt Samak, Belitung, Indonesia, 7 April 1953 [CGT]; 1 ♂ Mt Bantau, Belitung, Indonesia, 5 March 1958 [CGT]; 2 ♂♂ Belitung, Indonesia, September 2008, leg. M. Page [MGP]; 2 ♂♂ Bangka, Indonesia, April 1982 [MGP].

Derivatio nominis

This subspecies is named for its resemblance to *G. a. phyris* Jordan, 1937.

Diagnostic characters

This is a small subspecies, with sharply pointed FW and elongated HW. The tail on M3 is scarcely produced: the hindwing margin is more regular than in *G. a. adonarensis*. The green discal band is narrow on both wings and the apical three spots of the FW band are separated by black. The veins CuA2 to M3 are marked by fine black lines, with some white along CuA2.

The paratype males agree well with the holotype (average FW length 38.3 mm, range 36.4–40.0 mm). The single female is similar in size to the males (FW length 40.4 mm). The discal band is narrow, as in the males and is narrower than observed in the female from Sumatra.

Distribution

Indonesia (Bangka, Belitung).

Graphium adonarensis toxopei **n. subsp.**

Holotype: ♂, Lombok, Indonesia, December 1997 [SMF]. FW length 40.7 mm. (Fig. 17, Fig. 18 underside).

Paratypes: 5 ♂♂ Lombok, Indonesia, December 1997 [MGP]; 1 ♂ Lombok, Indonesia, January 2005 [MGP].

Derivatio nominis

This subspecies is named after J. Toxopeus in recognition of his contributions to the understanding of *Graphium sarpedon* and its races.

Diagnostic characters

A relatively small butterfly, with sharply pointed FW and elongated HW. The tail on M3 is slightly produced but

sharply pointed. The green discal band is narrow on both wings and the apical three spots of the FW band are separated by black. The veins CuA2 to M2 are marked by fine black lines, with some white along CuA2.

The paratype males agree well with the holotype (average FW length 40.9 mm, range 39.3–42.0 mm). The green FW band is narrower than that of *G. a. hundertmarki* or *G. a. adonarensis*. The FW is broader than that of *G. a. adonarensis* and the HW not so strongly elongated.

Distribution

Indonesia (Lombok).

Graphium adonarensis septentrionicolus **n. subsp.**

Holotype: ♂, Nowgang, Assam, India, 14 April 1964, leg. C. G. Treadaway [SMF]. FW length 40.6 mm. (Fig. 19, Fig. 20 underside).

Paratypes: 7♂♂ Khasi Hills, Meghalaya, India, April–June 1962, leg. S. K. Sirkar [CGT]; 5♂♂ Khasi Hills, Meghalaya, India, April–June 1962, leg. S. K. Sirkar [MGP]; 1♂ Central Fujian, April 2006, leg. Pan Yang [MGP]; 2♂♂ Central Fujian, April 2008, leg. Pan Yang [MGP]; 1♂ Shennongija, W. Hubei, June 1998, leg. Pan Yang [MGP].

Derivatio nominis

This subspecies is named for is northerly distribution (Latin: *septentrion* north, *colus* dweller).

Diagnostic characters

A small butterfly, with sharply pointed FW and elongated HW. The tail on M3 is strongly produced. The green discal band is very broad on both wings and only the apical spot of the FW band is clearly separated by black. The apical spot is very small. The veins CuA2 to M3 are marked with white and veins M2 and M1 are marked with black. The veins of the HW are marked with white where they traverse the discal band. The male genitalia (dissections of five specimens from Khasi Hills, two from Hubei and one from Fujian) have the distinguishing characters of *G. adonarensis*, as described above. They are readily distinguishable from those of sympatric, synchronous specimens of *G. sarpedon*.

The paratype males agree well with the holotype (average FW length 39.4 mm, range 36.8–42.4 mm).

Distribution

India (Assam, Meghalaya), China (Fujian, Hubei).

5.3 *Graphium anthedon* (Felder & Felder, 1864)

Papilio anthedon Felder & Felder, 1864. Type locality: Amboina.

G. anthedon (Felder & Felder, 1864) is a medium-sized species that typically has a deeper, blue-green colour than the preceding species (Fig. 21), but the colour varies considerably between the subspecies. Specimens of *G. a. dodingensis* Rothschild, 1896 from Morotai, Halmahera and Bacan exhibit an intense blue-green colour. The colour is somewhat less intense in specimens of *G. a. halesus* from Buru and can be greenish in some specimens of *G. a. anthedon* from Seram. The veins of the forewing are lined with black as they cross the band, except in *G. a. halesus* Fruhstorfer, 1907 from Buru and some specimens of *G. a. anthedon*, where those closer to the hind margin are lined with white. Specimens of the Sulawesi subspecies *G. a. monticolus* Fruhstorfer, 1896 have greenish-blue markings that are more similar to *G. sarpedon*. The veins are lined with white, as in *G. a. anthedon*. The width of the band decreases from the anal margin of the wing towards the tip of the cell. At the anal margin the width varies between subspecies: it is narrowest in *G. a. dodingensis* and broadest in *G. a. anthedon* and *G. a. monticolus*. Traces of a sub-marginal are encountered in specimens of *G. anthedon* from Seram and the *tetrix*-form of *G. a. monticolus* Fruhstorfer, 1896 has a full sub-marginal row of lunules. The full row of sub-marginal lunules is present on the underside of the forewing in some specimens of *G. anthedon* from Seram but not from any other island, amongst which it is normally restricted to one or two spots.

The band on the hindwing upperside has a white area in the cell Sc+R1 and is blue-green with some white highlighting in the other spots, especially in the small spot in cell Rs and along the adjacent veins. The vein CuA1 may be marked with black or white.

There are 4–6 blue-green lunules in the sub-marginal band, those in cells Rs, M1, M2 and M3 always being well marked. The lunules in cells Sc+R1 and CuA1 are weak and usually whitish: the lunule in cell CuA1 is absent in some specimens, especially of *G. a. dodingensis* and *G. a. halesus*. The lunule in cell M3 is usually weak in *G. a. monticolus* Fruhstorfer, 1896 and may be absent. The lunules in cells M1, M2 and M3 are strongly bent forming C- or <-shaped marks except in *tetrix*, where the angle formed at the outer margin of the spot is less acute. Specimens of *G. anthedon*, especially of the subspecies *G. a. anthedon*, *G. a. halesus*, and *G. a. monticolus* have an irregular hindwing margin produced by elongation of the veins Rs and M1–M3. The hindwing is otherwise rather broad and rounded towards the anal tornus.

Graphium anthedon anthedon (Felder & Felder, 1864)

Material examined

1♂, 1♀ [CGT], 12♂♂ [MGP] from Seram and Ambon.

Diagnostic characters

Relatively large (average ♂ FW length 44.0 mm) with rounded FW and HW. The blue-green band of the upperside is relatively broad, towards the anal margin of the FW.

Distribution

Indonesia (Kelang, Seram, Ambon).

G. anthedon dodingensis (Rothschild, 1896)

Papilio sarpedon dodingensis Rothschild, 1896. Type locality: Halmahera.

Material examined

Type material: Syntypes (♂*, ♀*) *Papilio sarpedon dodingensis* Rothschild, 1896 [BMNH]. – Additional material: 1♂ Bacan [CGT]; 17♂♂ Bacan, Morotai and Halmahera, 3♀♀ Bacan and Halmahera [MGP].

Diagnostic characters

Relatively large (average ♂ FW length 44.0 mm) with very rounded FW and HW. The blue-green band of the upperside is narrow. Specimens from Bacan and Morotai are somewhat smaller than those from Halmahera (♂ FW length range 40.0–45.0 mm for Bacan and Morotai compared to range 44.3–46.0 for Halmahera), but there is little difference in pattern. The females are somewhat larger (46.1–48.0 mm).

Distribution

Indonesia (Bacan, Morotai and Halmahera).

G. anthedon monticolus (Fruhstorfer, 1896) **n. comb.**

Papilio sarpedon monticolus Fruhstorfer, 1896. Type locality: Bua Kraeng, S. Celebes.

= *Graphium sarpedon tetrix* Tsukada & Nishiyama, 1980. Type locality: Celebes. [Synonym].

Material examined

Type material: Syntypes (♂*,♀*) *Papilio sarpedon monticolus* Fruhstorfer, 1896 [BMNH]. – Additional material: 1♂ central Sulawesi [CGT]; 1♂ Bantimurung, Macassar district, south Sulawesi, 7♂♂ Maros, Macassar district, south Sulawesi, 9♂♂ various locations in central Sulawesi [MGP].

Diagnostic characters

Relatively large (average FW length 43.5 mm, range 41.1–45.0 mm). The green discal band is yellowish green, close to that of *G. sarpedon*, rather than the blue-green usual in *G. anthedon*. The type specimen in the BMNH has only a few sparsely marked chevrons in the submarginal band Tsukada & Nishiyama (1980) separated *G. s. tetrix* from *G. s. monticolus* by the appearance of a strong submarginal band of green chevrons on the forewing. D'Abrera (1982) regarded *tetrix* as a straight synonym of *monticolus*, whereas Vane-Wright & de Jong (2003) reported that "superficial examination of museum material even suggests that the two taxa could represent separate species". Examination of these two forms collected at various locations on Sulawesi suggests that the distinguishing characteristic is quite variable. Specimens from the central part of Sulawesi always have the submarginal band, whereas those in the south are more variable with some having a very strong submarginal band and others having only indistinct markings. This is not a sufficiently stable character to warrant separation and we follow D'Abrera in regarding *G. s. tetrix* Tsukada & Nishiyama, 1980 as a junior synonym of *G. a. monticolus* Fruhstorfer, 1896. Tsukada & Nishiyama (1982) were incorrect in showing that the *tetrix*-form only occurs in central Sulawesi. The male genitalia of *G. a. monticolus* Fruhstorfer, 1896 (Fig. 37) are very similar to those of *G. anthedon* (Fig. 36) clearly indicating that it should be treated as a subspecies of the latter. There is no difference in the male genitalia between *monticolus*-forms and *tetrix*-forms that would support specific separation.

Distribution

Indonesia (Sulawesi).

Graphium anthedon crudus (Rothschild, 1898)

Papilio sarpedon crudus Rothschild, 1898. Type locality: Obi.

Material examined

Type material: Holotype ♂ [BMNH]. – Additional material: 1♂ Obi [MGP].

Diagnostic characters

Smaller than typical for *G. a. anthedon* (FW length 42 mm) with a narrower blue-green discal band.

Distribution

Indonesia (Obi).

Graphium anthedon halesus (Fruhstorfer, 1907)

Papilio sarpedon halesus Fruhstorfer, 1907. Type locality: Buru. [Homonym, nec. *Papilio halesus* Cramer, 1777, currently *Atlides halesus* (Lycaenidae)].

Material examined

Type material: Syntype ♂ *Papilio sarpedon halesus* Fruhstorfer, 1907 [BMNH]. – Additional material: 5♂♂ [CGT], 7♂♂ [MGP] from Buru.

Diagnostic characters

Relatively large (average ♂ FW length 43.2 mm) with rounded FW and HW. The blue-green band of the upperside is broad at the anal margin of the FW but tapers strongly towards the apex.

Distribution

Indonesia (Buru).

5.4 *Graphium milon* (Felder & Felder, 1865) **stat. rev.**

Papilio milon FELDER & FELDER, 1865. Type locality: Celebes.

G. milon (Figs. 23, 24) is the largest of the *G. sarpedon* group species. The band on the forewing upperside is narrow with an intense blue-green colour similar to that of *G. anthedon*. The veins of the forewing are broadly lined with black as they cross the band. The band is very narrow and uniform in width up to the tip of the cell. There are no sub-marginal markings. The discal band on the hindwing upperside has a white area in the cell Sc+R1 and is blue-green with little or no white highlighting in the other spots. The spot in cell Rs is absent. The veins M1 and CuA1 are strongly marked with black. There are 4–5 blue-green lunules in the sub-marginal band, those in cells Rs, M1, M2 and M3 always being well marked. The lunule in cell Sc+R1 is weak and usually whitish: the lunule in cell CuA1 is absent in most specimens. The lunules in cells M1, M2 and M3 are strongly bent forming C- or <-shaped marks. *G. milon* stands apart from all the other species in having the elongated and strongly bowed costal margin of the forewing found in many papilionids originating on Sulawesi. The hindwing is also rather elongated and produced towards the anal tornus, presumably in order to compensate for the elongated forewing.

Graphium milon milon (Felder & Felder, 1865)

Material examined

5 ♂♂ Sulawesi [CGT]; 18 ♂♂, 5 ♀♀ from Butung, Peleng, Muna and Sulawesi [MGP].

Diagnostic characters

Large (average ♂ FW length 49.8 mm) with the costal margin of the FW strongly bowed and falcate wing tip. The blue-green band of the upperside is narrow and the spots are clearly separated by black markings along the veins. Specimens from Muna (range ♂ FW length 46.7–49.9 mm) and Butung (range ♂ FW length 47.7–49.6 mm) are smaller than those from Sulawesi and Peleng (range ♂ FW length 47.0–52.6 mm) but there is no significant difference in pattern.

Distribution

Indonesia (Sulawesi, Kep. Talaud, Kabaena, Butung, Muna, Kep. Banggai [Peleng]).

Graphium milon sulaensis (Lathy, 1899)

Papilio sarpedon sulaensis LATHY, 1899. Type locality: Sula Is.
= *Papilio sarpedon coelius* FRUHSTORFER, 1899. Type locality: Sula Is. [Synonym].

Material examined

Type material: Syntypes *Papilio sarpedon sulaensis* Lathy, 1899 (♂*), *Papilio sarpedon coelius* Fruhstorfer, 1899 (♂*) [BMNH]. – Additional material: 1 ♂ Sula [CGT]; 6 ♂♂ from the Sula islands [MGP].

Diagnostic characters

Relatively large (average ♂ FW length 47.7 mm) with the costal margin of the FW strongly bowed and falcate wing tip. The blue-green band of the upperside is narrow and the spots are clearly separated by black markings along the veins. Smaller, and with a narrower discal band than *G. m. milon*.

Distribution

Indonesia (Kep. Sula [Mangole, Sanana]).

5.5 *Graphium isander* (Godman & Salvin, 1888) **stat. rev.**

Papilio isander GODMAN & SALVIN, 1888. Type locality: Aola, Guadalcanal I.

G. isander (Figs. 25, 26) has blue-green markings similar in intensity to *G. anthedon* from Seram. The veins of the forewing are highlighted with white as they cross the band in *G. i. imparilis* from New Guinea. The population of the central Solomon Islands (*G. i. isander*) appears to have the most primitive pattern, in retaining submarginal spots on the forewing upperside. Specimens from New Britain, New Ireland and New Guinea have male genitalia that are very similar to those of *G. isander* (Figs. 39, 40) and they are therefore included in this species.

Graphium isander isander (Godman & Salvin, 1888)

= *Papilio impar shortlandica* RIBBE, 1900. Type locality: Fauro, Shortlands.

Material examined

Type material: Holotype ♂ *Papilio impar shortlandica* Ribbe, 1900 [BMNH]. – Additional material: 5 ♂♂, 3 ♀♀ from Malaita and Guadalcanal, Solomon Islands [MGP].

Diagnostic characters

A large subspecies (average ♂ FW length 45.1 mm), with the blue-green discal band of similar colour and intensity to *G. anthedon*. There is a spot at the base of FW cell R2, which is rarely represented in other species, and well-formed submarginal spots. The latter are rectangular towards the apex of the wing and chevron-like towards the anal margin. They are homologous to the markings found in some subspecies of *G. anthedon*.

Distribution

Papua New Guinea (Bougainville), Solomon Islands (Choiseul, Florida, Guadalcanal, Malaita, Russell, Santa Isabel, Shortland Is.).

Graphium isander impar (Rothschild, 1895) **n. comb.**

Papilio sarpedon impar Rothschild, 1895. Type locality: Solomon Islands, New Georgia.

Material examined

Type material: Syntype ♀ [BMNH]. – Additional material: 1 ♀ [CGT], 1 ♂ [MGP] from Ghizo.

Diagnostic characters

Smaller than *G. i. isander* (FW length 43.6 mm) with a broader blue-green band. The submarginal spots are absent but the spot at the base of cell R2 is retained.

Distribution

Solomon Islands (Ghizo, New Georgia, Rubiana).

Graphium isander imparilis (Rothschild, 1895) **n. comb.**

Papilio sarpedon imparilis Rothschild, 1895. Type locality: New Britain, New Ireland, Duke of York.
= *Papilio sarpedon messogis* Fruhstorfer, 1907. Type locality: Key, Aru. [**n. syn.**].
= *Papilio sarpedon temnus* Fruhstorfer, 1907. Type locality: Deutsch Neu Guinea, Friederich Wilhelms Hafen, Dorey, Kapaur, Hattam, Britisch Neu Guinea (Milne Bai). [**n. syn.**].
= *Papilio sarpedon corycus* Fruhstorfer, 1907. Type locality: Waigiu. [**n. syn.**].

Material examined

Type material: Syntypes *Papilio sarpedon imparilis* Rothschild, 1895 (♂) [BMNH], *Papilio sarpedon corycus* Fruhstorfer, 1907 (♂*) [BMNH], *Papilio sarpedon messogis* Fruhstorfer, 1907 (♂*, ♀*) [BMNH], *Papilio sarpedon temnus* Fruhstorfer, 1907 (♂*, ♀*) [BMNH], the syntype ♂ held in the BMNH and identified as "Type" is from Neu Guinea, Fri. Wilh. Hafen. – Additional material: 1 ♂ Papua New Guinea [CGT]; 11 ♂♂, 5 ♀♀ from New Britain, New Guinea, New Ireland, Waigeo [MGP].

Diagnostic characters

Smaller than *G. i. isander* (average ♂ FW length 44 mm) and completely lacks the submarginal band of spots as well as the basal spot in cell R2. There is no significant difference between specimens from New Britain, New Ireland and New Guinea and these should all be treated as the same subspecies, for which the name *imparilis* Rothschild, 1895 is available. The subspecies described from Key and Aru (*messogis* Fruhstorfer, 1907), New Guinea (*temnus* Fruhstorfer, 1907) and Waigeo (*corycus* Fruhstorfer, 1907) are all thus placed as junior synonyms of *G. i. imparilis* (Rothschild, 1895).

D'Abrera (1971) included this subspecies in *G. choredon* saying that he could not find any differences. However, the male and female genitalia, as well as similar blue-green colour of the wings, clearly place this taxon in *G. isander* rather than *G. choredon*.

Distribution

Indonesia (West Papua, Key, Aru, Waigeo), Papua New Guinea (Provinces on New Guinea island, New Britain, New Ireland, Duke of York I.).

5.6 *Graphium choredon* (Felder & Felder, 1864) **stat. rev.**

Papilio choredon Felder & Felder, 1864. Type locality: Australia; New Guinea; Waigeu; Woodlark.

Material examined

2 ♀♀ from Queensland, Australia [CGT]; 2 ♂♂, 2 ♀♀ from Queensland, Australia [MGP].

Diagnostic characters

A small species (♂ FW length 38.8, 42.1 mm), *G. choredon* has a variable green to yellowish-green colour with considerable highlighting in white of the veins and frequently has short tails at M3 on the hindwing (Figs. 27, 28). The more yellowy green colour and the short pointed tails are the most distinctive external features separating *G. choredon* from *G. i. imparilis* from New Guinea and Waigeo.

Distribution

Eastern coast of Australia (Queensland–New South Wales).

5.7 *Graphium teredon* (Felder & Felder, 1865) **stat. rev.**

Papilio teredon Felder & Felder, 1865. Type locality: Ceylon.
= *Delchina thermodusa* Swinhoe, 1885. Type locality: Matheran.

Material examined

1 ♂ Sri Lanka [CGT]; 1 ♂ South India (Kerala), 1 ♂ Sri Lanka [MGP].

Diagnostic characters

A small species (♂ FW length 38.0, 39.6 mm), *G. teredon* usually has blue-green spots, similar to *G. anthedon*, but individuals with yellowish-green colour (Figs. 29, 30) are not uncommon.

Distribution

Southern India and Sri Lanka.

5.8 *Graphium jugans* (Rothschild, 1896) **stat. rev.**

Papilio sarpedon jugans ROTHSCHILD, 1896. Type locality: Sumba.

The smallest of the *G. sarpedon* group species, *G. jugans* (Figs. 31, 32) typically has blue-green markings similar in intensity to that seen in *G. isander* and considerable highlighting in white as in that species but not as extensive as is observed in *G. choredon*.

Distribution of species: Indonesia (Sumba, Timor, Wetar).

Graphium jugans jugans (Rothschild, 1896)

Material examined

Type material: Syntype ♂ [BMNH]. – Additional material: 1 ♂ Sumba [MGP].

Diagnostic characters

A small subspecies (♂ FW length 36.0 mm) with sharply pointed FW and elongated HW produced in a sharp stubby tail at M3. The discal band of green spots is relatively broad, similar to *G. adonarensis*, but with a more bluish hue.

Distribution

Indonesia (Sumba).

Graphium jugans wetterensis Okano, 1993 **n. comb.**

Graphium sarpedon wetterensis OKANO, 1993. Type locality: Wetar.

Material examined

2 ♂♂ Wetar [MGP].

Diagnostic characters

A small subspecies (♂ FW length 35.8, 37.3 mm) with sharply pointed FW and elongated HW produced in a sharp stubby tail at M3. The discal band of green spots is broader than *G. j. jugans* and distinctly blue-green, rather than green.

Distribution

Indonesia (Wetar).

Graphium jugans kawaimitsuoi Fujioka, 1997 **n. comb.**

= *Papilio sarpedon timorensis* ROTHSCHILD, 1896. Type locality: Timor. [Homonym, nec. *Papilio polytes timorensis* Felder & Felder, 1864].

Graphium sarpedon kawaimitsuoi FUJIOKA [in FUJIOKA, TSUKIYAMA & CHIBA] 1997. Proposed as a replacement name for *Papilio sarpedon timorensis* Rothschild, 1896.

= *Graphium sarpedon cesa* KOÇAK & KEMEL, 2000. Proposed as a replacement name for *Papilio sarpedon timorensis* Rothschild, 1896. [**n. syn.**].

Material examined

Type material: Holotype ♂ *Papilio sarpedon timorensis* Rothschild, 1896 [BMNH]. – Additional material: 2 ♂♂, 1 ♀ Timor [MGP].

Diagnostic characters

A small subspecies (♂ FW length 35.5, 37.5 mm) with sharply pointed FW and elongated HW produced in a sharp stubby tail at M3. The discal band of green spots is narrower than in *G. j. wetterensis* but similar in colour.

Distribution

Indonesia (Timor).

6 Discussion

Graphium adonarensis is separated from *G. sarpedon* and raised to species rank on the basis of significant differences in the male and female genitalia as well as in the sequences of the mitochondrial ND5 and nuclear 28S rRNA genes. It is sympatric and synchronous with *G. sarpedon* in N. India and parts of China. *G. anthedon* is separated from *G. milon* on the basis of significant differences in the male and female genitalia as well as in the sequences of the mitochondrial ND5 genes. Both have previously been recognized as species distinct from *G. sarpedon* (MURAYAMA 1978, TSUKADA & NISHIYAMA 1982, MOONEN 1998, VANE-WRIGHT & DE JONG 2003, PEGGIE et al. 2005). *G. monticolus* is placed as a subspecies of *G. anthedon* on the basis of the very similar male genitalia. Thus, *G. anthedon* and *G. milon* are sympatric on Sulawesi. *G. isander* is separated from *G. sarpedon* and raised to species rank on the basis of significant differences in pigmentation/scale structure as well as in the male and female genitalia. *G. choredon* is separated from *G. sarpedon* and raised to species rank on the basis of significant differences in pigmentation/scale structure as well as in the male and female genitalia. *G. choredon* differs from *G. isander* in the structure of both male and female genitalia and the two are accordingly recognized as separate species. *G. jugans* is separated from *G. sarpedon* and raised to species rank on the basis of significant differences in pigmentation/scale structure and structure of the male genitalia. There are some similarities between *G. jugans* and *G. choredon* and further investigation is necessary to clarify their relationship. *G. teredon* is separated from *G. sarpedon* and raised to species rank on the basis of significant differences in pigmentation/scale structure and structure of the male genitalia.

7 Check list of the *Graphium sarpedon* species group

Graphium sarpedon (Linnaeus, 1758)
- *G. sarpedon sarpedon* (Linnaeus, 1758)
  - = *Papilio protensor* Gistel, 1857 = *Papilio semifasciatus* Honrath, 1888
- *G. sarpedon nipponus* (Fruhstorfer, 1903)
  - = *Papilio sarpedon sarpedonides* Fruhstorfer, 1908 = *Papilio sarpedon intermedium* Kato, 1940 = *Papilio sarpedon hachijoinsulanum* Kato, 1942
- *G. sarpedon connectens* (Fruhstorfer, 1906)
  - = *Papilio sarpedon surusumi* Matsumura, 1909
- *G. sarpedon luctatius* (Fruhstorfer, 1907)
  - = *Papilio sarpedon melas* Fruhstorfer, 1907 = *G. sarpedon corbeti* Toxopeus, 1951
- *G. sarpedon colus* (Fruhstorfer, 1907)
- *G. sarpedon pagus* (Fruhstorfer, 1907)
- *G. sarpedon morius* (Fruhstorfer, 1908)
- *G. sarpedon sirkari* n. subsp.

Graphium cloanthus (Westwood, 1845)
- *G. cloanthus cloanthus* (Westwood, 1845)
- *G. cloanthus clymenus* (Leech, 1893)
  - = *G. cloanthus nyghmat* Koçak & Kemal, 2000
- *G. cloanthus kuge* (Fruhstorfer, 1908)
- *G. cloanthus sumatranum* (Hagen, 1894)

Graphium anthedon (Felder & Felder, 1864)
- *G. anthedon anthedon* (Felder & Felder, 1864)
- *G. anthedon dodingensis* (Rothschild, 1896)
- *G. anthedon monticolus* (Fruhstorfer, 1896) n. comb.
  - = *G. sarpedon tetrix* Tsukada & Nishiyama, 1980
- *G. anthedon crudus* (Rothschild, 1898)
- *G. anthedon halesus* (Fruhstorfer, 1907)

Graphium choredon (Felder & Felder, 1864)

Graphium milon (Felder & Felder, 1865)
- *G. milon milon* (Felder & Felder, 1865)
- *G. milon sulaensis* (Lathy, 1899)
  - = *Papilio sarpedon coelius* Fruhstorfer, 1899

Graphium teredon (Felder & Felder, 1865)
- = *Delchina thermodusa* Swinhoe, 1885

Graphium isander (Godman & Salvin, 1888)
- *G. isander* (Godman & Salvin, 1888)
- *G. isander impar* (Rothschild, 1895)
- *G. isander imparilis* (Rothschild, 1895)
  - = *Papilio sarpedon messogis* Fruhstorfer, 1907 = *Papilio sarpedon temnus* Fruhstorfer, 1907 = *Papilio sarpedon corycus* Fruhstorfer, 1907

Graphium adonarensis (Rothschild, 1896)
- *G. adonarensis adonarensis* (Rothschild, 1896)
- *G. adonarensis rufofervidus* (Fruhstorfer, 1897)
- *G. adonarensis rufocellularis* (Fruhstorfer, 1905)
- *G. adonarensis phyris* (Jordan, 1937)
- *G. adonarensis lycianus* (Toxopeus, 1951)
- *G. adonarensis hundertmarki* n. subsp.
- *G. adonarensis agusyantoei* n. subsp.
- *G. adonarensis phyrisoides* n. subsp.
- *G. adonarensis toxopei* n. subsp.
- *G. adonarensis septentrionicolus* n. subsp.

Graphium jugans (Rothschild, 1896)
- *G. jugans jugans* (Rothschild, 1896)
- *G. jugans wetterensis* Okano, 1993
- *G. jugans kawaimitsuoi* Fujioka, 1997 n. comb.
  - = *Papilio sarpedon timorensis* Rothschild, 1896 = *G. sarpedon cesa* Koçak & Kemel, 2000

Graphium sandawanum (Yamamoto, 1977)
- *G. sandawanum sandawanum* (Yamamoto, 1977)
- *G. sandawanum joreli* (Nuyada, 1994)

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Checklist of the shore fishes of Europa Island, Mozambique Channel, southwestern Indian Ocean, including 302 new records

Ronald Fricke, Patrick Durville, Giacomo Bernardi, Philippe Borsa, Gérard Mou-Tham & Pascale Chabanet

Abstract

An annotated checklist of the fish species of Europa Island (Mozambique Channel, southwestern Indian Ocean) comprises a total of 389 species in 62 families. 302 species are recorded from Europa Island for the first time. All species are autochthonous; no introduced species have been found. The fish fauna is exclusively marine, with the Labridae, Pomacentridae, Serranidae, Gobiidae and Acanthuridae being the families with most representatives.

The fish fauna at Europa Island is typical for offshore, low islands in the southwestern Indian Ocean. Zoogeographically, the main element of the fish fauna of Europa Island consists of widespread tropical Indo-Pacific species (292 species, 75.1 % of the total occurring species). A total of 13 species (3.3 %) are found worldwide, either circumtropical or circumtropical including warm temperate zones. An additional 76 species (19.5 %) are Indian Ocean endemics, including 36 western Indian Ocean endemics (9.2 %), and 10 southwestern Indian Ocean endemics (2.6 %). No endemic fish species are reported for Europa Island.

Keywords: Checklist, Pisces, southwestern Indian Ocean, Europa Island, new records, zoogeography.

Zusammenfassung

Die Checkliste der Fische der Insel Europa (Kanal von Mosambik, südwestlicher Indischer Ozean) enthält 389 Arten in 62 Familien. 302 Arten werden zum ersten Mal von der Insel Europa beobachtet. Alle Fischarten sind authochthon; es wurden keine durch den Menschen eingeführten oder eingeschleppten Arten gefunden. Alle Fischarten sind marin; die artenreichsten Fischfamilien sind die Labridae, Pomacentridae, Serranidae, Gobiidae und Acanthuridae.

Die Fischfauna der Insel Europa ist typisch für küstenferne, niedrige Inseln im südwestlichen Indischen Ozean. Zoogeographisch haben 75,1 % der nachgewiesenen Fischarten eine großräumige indo-pazifische Verbreitung, 3,3 % der Arten werden in allen tropischen Meeren gefunden, und 19,5 % der Arten sind im Indischen Ozean endemisch, davon 9,2 % nur im westlichen Indischen Ozean und 2,6 % im südwestlichen Indischen Ozean. Es wurden keine endemischen Fischarten bei der Insel Europa gefunden.

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1 Introduction

Europa Island is situated in the southern part of the Mozambique Channel, southwestern Indian Ocean at 22°22'S 40°22'E, approximately 355 km westnorthwest of Toliara (Madagascar), and 529 km eastnortheast of Inhambane (Mozambique). The island was named after the British ship 'Europa' which visited in 1774. As one of the Îles Éparses, it has been administered by France since 1897, and is part of the Terres australes et antarctiques françaises (TAAF) since 2005. A small settlement existed since ca. 1860 but was abandoned in the 1920s. Today the island is uninhabited except for a small garrison hosting a detachment of the French army, and a French gendarme. There is no harbour available, only a boat mooring off the northwestern fringing reef.

The island measures 7 by 6 km (28 km^2). It is a former atoll which was uplifted to a maximum altitude of 7 m, leaving the fossil coral reefs dry. Nowadays it is surrounded by a fringing reef with a narrow and shallow lagoon, which only widens towards the north of the island, where there is also the entrance of an extensive inland lagoon system which is surrounded by mangroves on its inner side. Several typical coastal marine habitats are shown in Figs. 2–5.

The knowledge of the fish fauna of Europa Island was hitherto limited to a publication by Fourmanoir (1952), who recorded 99 fish species from the island.

The present paper provides an updated checklist of the shore fishes of the island, based on 1) visual censuses during a visit of the R/V 'Marion Dufresne 2' (April 2011), where 243 fish species were observed (P. Durville, P. Chabanet, G. Bernardi, P. Borsa & G. Mou-Tham), and 2) the mission BioReCIE 2011 (Biodiversity, Resources and Conservation of coral reefs at Îles Éparses; 7–13 Nov. 2011), where numerous fish species were observed and collected (P. Chabanet, P. Durville, R. Fricke).

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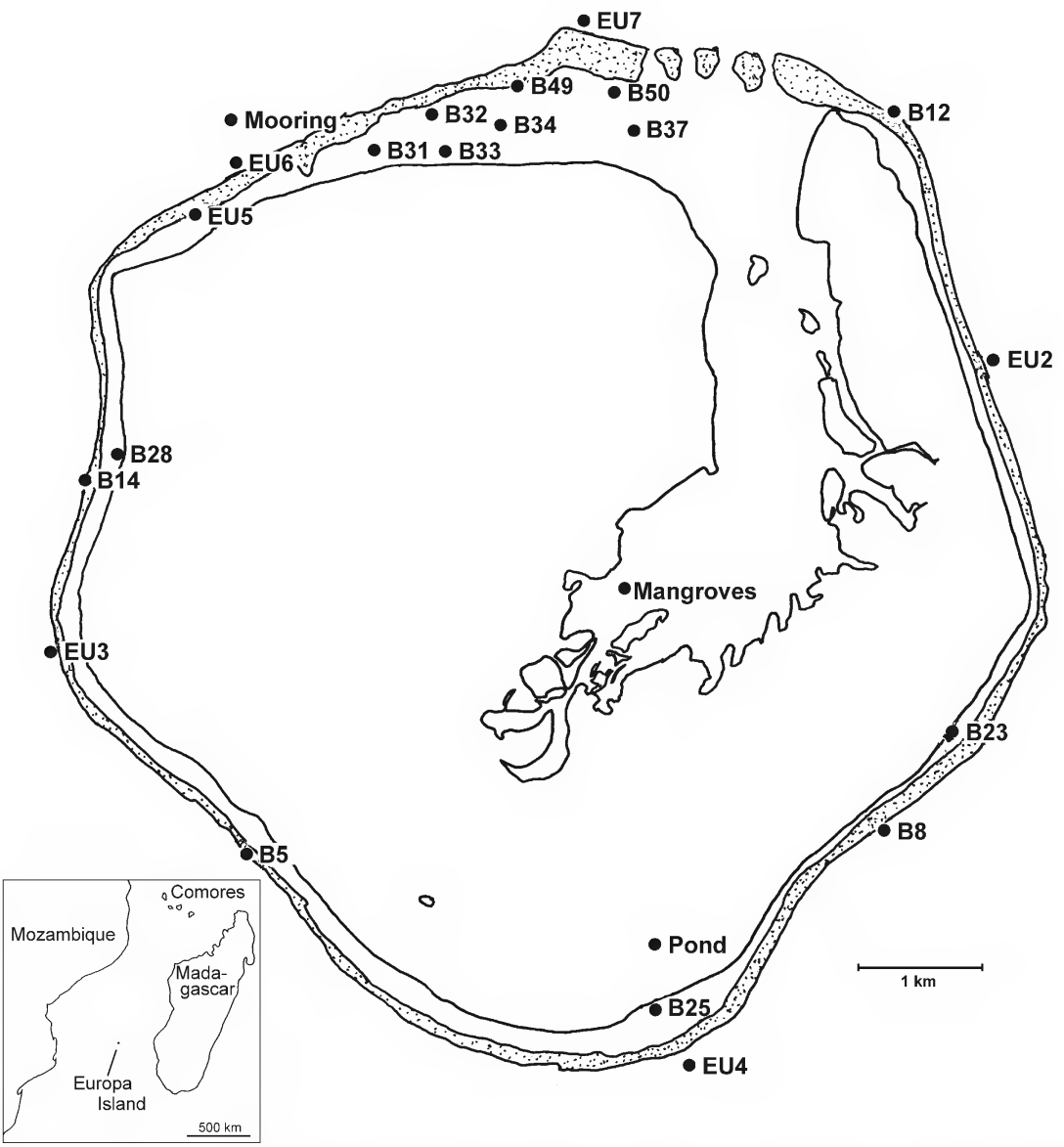

Fig. 1. Europa Island with stations of mission BioReCIE 2011, Nov. 2011. – Solid line represents the coast at high tide, the dotted areas show the fringing reef.

Tab. 1. Station data of the mission BioReCIE 2011 to Europa Island, Nov. 2011.

Station	Area	Geographic Coordinates	Date, Time	Habitat	Depth	Observers
EU2	East	22°21'10.476"S 40°23'48.228"E	10 Nov. 2011 12:30–13:30 h	Coral reef slope	13 m	Pascale Chabanet, Patrick Durville
EU3	West	22°22'22.8"S 40°19'29.388"E	9 Nov. 2011 09:40–10:40 h	Coral reef slope (Fig. 4)	11–13 m	Pascale Chabanet, Patrick Durville
EU4	South	22°24'14.436"S 40°22'12.936"E	9 Nov. 2011 13:40–14:40 h	Coral reef slope	12 m	Pascale Chabanet, Patrick Durville
EU5	North	22°20'28.356"S 40°20'15.468"E	11 Nov. 2011 08:00–09:00 h; 13 Nov. 2011 08:00–09:00	Reef flat (Fig. 2)	0–2 m	Pascale Chabanet, Patrick Durville, Ronald Fricke
EU6	North	22°20'26.268"S 40°20'13.776"E	8 Nov. 2011 10:10–11:10 h	Coral reef slope	8–10 m	Pascale Chabanet, Patrick Durville
EU7	North	22°19'45.948"S 40°21'54.288"E	7 Nov. 2011 09:00–10:00 h	Coral reef slope	9–12 m	Pascale Chabanet, Patrick Durville
B5	Southwest	22°23'02.436"S 40°20'15"E	11 Nov. 2011 14:15–15:15 h	Coral reef slope	10 m	Pascale Chabanet, Patrick Durville
B8	Southeast	22°23'07.008"S 40°23'18.816"E	10 Nov. 2011 09:18–10:18 h	Coral reef slope	11 m	Pascale Chabanet, Patrick Durville
B12	Northeast	22°20'07.116"S 40°23'19.968"E	12 Nov. 2011 09:00–10:00 h	Coral reef slope	10 m	Pascale Chabanet, Patrick Durville
B14	West	22°21'32.436"S 40°19'46.776"E	11 Nov. 2011 09:15–10:15 h	Coral reef slope	12 m	Pascale Chabanet, Patrick Durville
B23	Southeast	22°22'50.87"S 40°23'29.64"E	12 Nov. 2011	Reef flat	0–1 m	Patrick Durville
B25	South	22°23'51.29"S 40°22'15.30"E	12 Nov. 2011	Reef flat	0–1 m	Patrick Durville
B28	West	22°21'34.524"S 40°19'52.32"E	9 Nov. 2011 08:10–09:20 h; 11 Nov. 2011 10:15–11:45 h; 12 Nov. 2011 10:30–12:20 h	Reef flat with tidal pools (Fig. 3)	0–1 m	Ronald Fricke
B31	North	22°20'25.81"S 40°20'42.75"E	7 Nov. 2011 09:30–10:30 h	Reef flat	0–1 m	Ronald Fricke
B32	North	22°20'21.04"S 40°20'42.35"E	7 Nov. 2011 10:30–11:30 h	Reef flat	0–1 m	Ronald Fricke
B33	North	22°20'24.58"S 40°20'51.88"E	7 Nov. 2011 08:30–09:30 h	Reef flat	0–1 m	Ronald Fricke
B34	North	22°20'16.52"S 40°20'54.51"E	8 Nov. 2011 09:30–11:30 h	Lagoon	0–1 m	Ronald Fricke
B37	North	22°20'07.00"S 40°21'57.50"E	10 Nov. 2011 08:50–09:50 h	Lagoon	0–1 m	Ronald Fricke
B49	Centre	22°20'09.19"S 40°21'13.55"E	8 Nov. 2011 11:30–12:30 h	Reef flat	0–1 m	Ronald Fricke
B50	Centre	22°19'59.54"S 40°21'53.67"E	10 Nov. 2011 09:50–10:50 h	Reef flat	0–1 m	Ronald Fricke
Mangroves	Centre	22°22'19.29"S 40°22'22.73"E	11 Nov. 2011	Mangroves, sand bottom (Fig. 5)	0–2 m	Pascale Chabanet, Patrick Durville
Mooring	North	22°20'24.15"S 40°20'11.64"E	11 Nov. 2011	Sand and patch reef	18 m	Patrick Durville
Pond	South	22°23'21.79"S 40°22'37.59"E	12 Nov. 2011	Sand, fossil coral	0–1 m	Patrick Durville

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2 Methods and Materials

The present paper provides a list of all shore fishes recorded from Europa Island. For each species, the first record from Europa Island is given. During the BioReCIE 2011 project, attempts were made to confirm previous records of fishes from the island. If a species is recorded from Europa Island for the first time, information on the source of the new record is presented. In addition, synonyms and misidentifications used in the literature on Europa Island are provided, as well as English and French vernacular names. The genus and species classification follows Eschmeyer & Fricke (2011). The species accounts include data on the stations where the species were observed or collected. The expedition with R/V Marion Dufresne in April 2011 is abbreviated as MD-11. Details of the station data of Europa Island (mission BioReCIE 2011) are given in Tab. 1; the positions of the stations (abbreviated "St." in the text) are shown in Fig. 1.

While some new records are based on specimens collected, a considerable percentage of the new records is based on observations and/or photographs, as collecting was difficult due to strong currents. New records are only included when the identification was unambiguous. For materials in collections, a catalogue number is provided, followed by the number of specimens, in parentheses.

For the distribution analysis, the following works were consulted to assess the fish fauna of islands and island groups in the Western Indian Ocean: **Seychelles**, Smith & Smith (1963) and Randall & Egmont (1994), updated using various papers including Allen (1972), Dawson (1967, 1968, 1977), Fraser & Lachner (1985), Golani (1984), Hoese & Reader (1985), Holleman (2005, 2007), Keith et al. (2004), Kim & Amaoka (2001), Lachner & Karnella (1978, 1980), Polunin & Lubbock (1977), Randall (1999, 2001), Randall & Clements (2001), Randall & Heemstra (1985, 2009), Randall & Lourie (2009), Randall et al. (2008), Schwarzhans & Møller (2007), Springer & Williams (1994), Starck (1969), Tyler (1966), Uiblein (2011); **Maldives**, Randall & Anderson (1993) and Anderson et al. (1998), updated using various papers including Allen & Erdmann (2006), Allen & Randall (2002), Gon & Randall (2003), Kuiter & Debelius (1999), Randall (2001, 2011), Smith-Vaniz (2010); **Chagos Archipelago**, Winterbottom & Anderson (1997), updated using various papers including Böhlke (2000), Craig (2008), Gill & Edwards (2004), Holleman (2005), Randall & Earle (2008), Schwarzhans et al. (2005); **Réunion**, Fricke et al. (2009); **Mauritius**, Fricke (1999), updated using various papers including Fraser & Allen (2001), Fricke (2009), Gill & Fricke (2001), Holleman (2007), Randall (2004, 2007, 2011), Randall & Gon (2006), Randall & Schultz (2008), Randall & Smith (2001), Schwarzhans & Møller (2007), Springer & Fricke (2000); **Rodrigues**, Heemstra et al. (2004), updated using papers including Gill & Edwards (2004) and Holleman (2005). The general distribution of fish species occurring at Europa Island was accessed using Eschmeyer & Fricke (2011), Fricke et al. (2009) and Froese & Pauly (2011).

Abbreviation of museum collection

SMF Forschungsinstitut Senckenberg, Frankfurt/Main, Germany

3 Checklist

Carcharhinidae

Carcharhinus albimarginatus (Rüppell, 1837) – Silvertip shark; requin pointe blanche. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. EU3, B8.

Carcharhinus amblyrhynchos (Bleeker, 1856) – Grey reef shark; Requin dagsit. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. EU4, B8.

Carcharhinus melanopterus (Quoy & Gaimard, 1824) – Blacktip reef shark; Requin à pointes noires. – Distribution: First record from Europa Island by Fourmanoir (1952: 172, pl. 10B); record confirmed by P. Durville et al. during the expedition MD-11, an observation by P. Borsa in the mangrove area on 7 April 2011, and by R. Fricke on 10 Nov. 2011, St. B37; also observed by P. Durville & P. Chabanet, 12 Nov. 2011, St. B12, B25.

Carcharhinus obscurus (LeSueur, 1818) – Dusky shark; Requin sombre. – Distribution: First record from Europa Island by Fourmanoir (1952: 179).

Galeocerdo cuvier (Péron & LeSueur in LeSueur, 1822) – Tiger hark; Requin tigre. – Distribution: First record from Europa Island by Fourmanoir (1952: 179, pl. 10A) as *Galeocerdo Cuvieri*.

Triaenodon obesus (Rüppell, 1837) – Whitetip reef shark, bluntnead shark; Requin corail. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Sphyrnidae

Sphyrna lewini (Griffith & Smith, 1834) – Scalloped hammerhead; Requin-marteau halicorne. – Distribution: **New record** from Europa Island, based on a photograph by E. Bretagne, taken in November 2011; the species was also observed by P. Durville et al. (as *Sphyrna* sp.) during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. EU3, B8.

Sphyrna mokarran (Rüppell, 1837) – Great hammerhead shark; Grand requin-marteau. – Distribution: **New record** from Europa Island, based on photograph by E. Bretagne, taken in November 2011.

Dasyatidae

Neotrygon kuhlii (Müller & Henle, 1841) – Blue-spotted stingray; Raie à points bleus. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Taeniura sp. – Distribution: Recorded from Europa Island by P. Durville & P. Chabanet, 12 Nov. 2011, St. B25.

Albulidae

Albula glossodonta (Forsskål in Niebuhr, 1775) – Indo-Pacific bonefish; Banane (Réunion). – Distribution: Reported from Europa Island as *Albula vulpes* by Fourmanoir (1952: 174, pl. 11A).

Moringuidae

Moringua javanica (Kaup, 1856) – Java spaghetti eel. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34766 (4), SMF 34807 (5).

Muraenidae

Echidna nebulosa (Ahl, 1789) – Snowflake moray, floral moray; Murène étoilée. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34767 (3), SMF 34808 (5).

Gymnothorax breedeni McCosker & Randall, 1977 – Blackcheek moray; Murène masquée. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Gymnothorax buroensis (Bleeker, 1857) – Vagrant moray; Murène errante. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 12 Nov. 2011, St. B28. – Material: SMF 34809 (6).

Gymnothorax flavimarginatus (Rüppell, 1830) – Yellow-edged moray, yellow-margined moray; Congre queue verte, murène à queue verte (Réunion), murène à bord jaune (France). – Distribution: First record from Europa Island as *Lycodontis Lemayi* by Fourmanoir (1952: 188).

Gymnothorax griseus (Lacepède [ex Commerson], 1803) – Geometric moray; Murène tatouée. – Distribution: **New record** from Europa Island, based on observations by R. Fricke on 7–9 Nov. 2011, St. B28, B32.

Gymnothorax javanicus (Bleeker, 1859) – Giant moray; Murène javanaise. – Distribution: **New record** from Europa Island, based on an observation by P. Durville & P. Chabanet during the expedition MD-11.

Gymnothorax meleagris (Shaw in Shaw & Nodder, 1795) – Whitemouth moray, Turkey moray; Congre pintade (Réunion), murène voie lactée (France). – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. EU2, EU3.

Gymnothorax pictus (Ahl, 1789) – Peppered moray, paintspotted moray; Congre (Réunion), murène sidérale (France) (Fig. 6). – Distribution: First record from Europa Island as *Siderea picta* by Fourmanoir (1952: 170); record confirmed by P. Durville et al. during the expedition MD-11, a photograph taken by P. Borsa in the mangrove area on 7 April 2011, and specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28; also observed by P. Durville & P. Chabanet, 12 Nov. 2011, St. B25. – Material: SMF 34768 (1), SMF 34810 (2).

Gymnothorax rueppellii (McClelland, 1844) – Banded moray, yellow-headed moray. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34769 (2), SMF 34811 (1).

Ophichthidae

Myrichthys colubrinus (Boddaert, 1781) – Ringed snake eel, banded snake eel, harlequin snake eel. – Distribution: First record from Europa Island by Fourmanoir 1952: 188.

Myrichthys maculosus (Cuvier, 1816) – Ocellated snake eel, spotted snake eel, tiger snake eel; Anguille-serpent maculée. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34770 (1), SMF 34812 (2).

Congridae

Conger cinereus Klunzinger [ex Rüppell], 1830 – Longfin African conger; Congre à moustache. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34752 (1), SMF 34795 (11).

Chanidae

Chanos chanos (Forsskål in Niebuhr, 1775) – Milkfish; Chano. – Distribution: **New record** from Europa Island, based on visual record by Nicole Gravier-Bonnet on 3 June 2006 in a little pond on southeastern part of Europa Island; record confirmed based on photograph by E. Bretagne, taken off the reef on the north shore of Europa Island in November 2011, and on an observation by R. Fricke on 11 Nov. 2011, St. EU5.

Clupeidae

Herklotsichthys quadrimaculatus (Rüppell, 1837) – Bluestripe herring, blueline herring; Sardine (Réunion). – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Spratelloides gracilis (Temminck & Schlegel, 1846) – Silverstripe round herring. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Synodontidae

Synodus binotatus Schultz in Schultz, Herald, Lachner, Welander & Woods, 1953 – Twospot lizardfish; Anoli à deux taches. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 7–10 Nov. 2011, St. B33, B34, B37, B50.

Synodus dermatogenys Fowler, 1912 – Sand lizardfish; Anoli bigarré. – Distribution: **New record** from Europa Island, based on a specimen collected by R. Fricke on 12 Nov. 2011, St. B28. – Material: SMF 34823 (1).

Carapidae

Encheliophis homei (Richardson, 1846) – Silver pearlfish. – Distribution: **New record** from Europa Island, based on a specimen collected and photographed by P. Chabanet on 11 Nov. 2011, among the mangroves in the inner lagoon. The fish was associated with *Bohadschia atra* Massin, Raso-

lofonirina, Conand & Samyn, 1999 (C. Conand, pers. comm., 31 Mar. 2012). – Material: SMF 34784 (1).

Antennariidae

Antennarius commerson (Lacepède [ex Commerson] in Anonymus, 1798) – Big angler, giant frogfish, Commerson's frogfish; Grenouille de Commerson. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Atherinidae

Atherinomorus lacunosus (Bloch & Schneider [ex Forster], 1801) – Hardyhead silverside; Athérine têtue. – Distribution: Reported from Europa Island as *Atherina* sp. by Fourmanoir (1952: 187).

Mugilidae

Chelon macrolepis (Smith, 1846) – Largescale mullet; Mulet à grandes écailles. – Distribution: First record from Europa Island as *Liza macrolepis* by Fourmanoir (1952: 175); record confirmed by P. Durville et al. based on a observation at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, by a photograph taken in the mangrove area by P. Borsa on 7 April 2011, and by R. Fricke on 9 Nov. 2011, St. B28.

Valamugil sp. – Distribution: Observed at Europa Island by P. Durville et al. during the expedition MD-11.

Hemiramphidae

Hemiramphus far (Forsskål in Niebuhr, 1775) – Black-barred halfbeak; Demi-bec bagnard. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Hyporhamphus dussumieri (Valenciennes in Cuvier & Valenciennes, 1847) – Dussumier's halfbeak; Demi-bec de Dussumier. – Distribution: First record from Europa Island by Fourmanoir (1952: 185).

Belonidae

Strongylura leiura (Bleeker, 1850) – Yellowfin needlefish; Orphie littorale (Fig. 7). – Distribution: **New record** from Europa Island, based on an observation and photograph by P. Durville et al. during the expedition MD-11, and an observation by P. Borsa in the mangrove area on 7 April 2011.

Tylosurus crocodilus (Péron & LeSueur in LeSueur, 1821) – Hound needlefish, crocodile needlefish; Aiguille (Réunion), orphie crocodile (France). – Distribution: Reported from Europa Island as *Belone choram* (non Rüppell, 1837) by Fourmanoir (1952: 170), and as *Tylosurus choram* (non Rüppell, 1837) by Fourmanoir (1952: 185); record of *Tylosurus crocodilus* confirmed by P. Durville et al. during the expedition MD-11.

Holocentridae

Myripristis adusta Bleeker, 1853 – Shadowfin soldier; Marignan ombré. – Distribution: **New record** from Europa Island, based on an observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Myripristis berndti Jordan & Evermann, 1903 – Blotcheye soldierfish, bigscale soldierfish; Cardinal (Réunion), marignan à oeillères (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU7; and by R. Fricke on 11 Nov. 2011, St. EU5.

Myripristis kuntee Valenciennes in Cuvier & Valenciennes, 1831 – Shoulderbar soldierfish, epaulette soldierfish, pearly soldierfish; Marignan ardoisé. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Myripristis murdjan (Forsskål in Niebuhr, 1775) – Pinecone soldierfish, blotcheye soldier, red soldierfish; Cardinal gros écailles (Réunion), marignan pomme de pin (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 184); record confirmed by R. Fricke based on an observation on 10 Nov. 2011, St. B37.

Myripristis vittata Valenciennes in Cuvier & Valenciennes, 1831 – Immaculate soldier, white-tipped soldierfish; Cardinal petit écailles (Réunion). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Neoniphon sammara (Forsskål in Niebuhr, 1775) – Bloodspot squirrelfish; Marignan tacheté. – Distribution: First record from Europa Island as *Holocentrus sammara* by Fourmanoir (1952: 185); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Sargocentron caudimaculatum (Rüppell, 1838) – Silverspot squirrelfish, tailspot squirrelfish; Marignan rouge et argent. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, B14, EU2, EU7; record confirmed by R. Fricke based on an observation on 9–11 Nov. 2011, St. EU5.

Sargocentron diadema (Lacepède [ex Commerson], 1802) – Crown squirrelfish; Soldat couronné. – Distribution: First record from Europa Island as *Holocentrus diadema* by Fourmanoir (1952: 174).

Sargocentron spiniferum (Forsskål in Niebuhr, 1775) – Sabre squirrelfish, long-jawed squirrelfish; Cardinal lancette (Réunion), marignan sabre (France). – Distribution: First record from Europa Island as *Holocentrus spiniferus* by Fourmanoir (1952: 183); record confirmed by P. Durville et al. based on a observation at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B8, B12, EU7.

Syngnathidae

Choeroichthys smithi Dawson, 1976 – Smith's short-bodied pipefish. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11 Nov. 2011, St. B28. – Material: SMF 34781 (5).

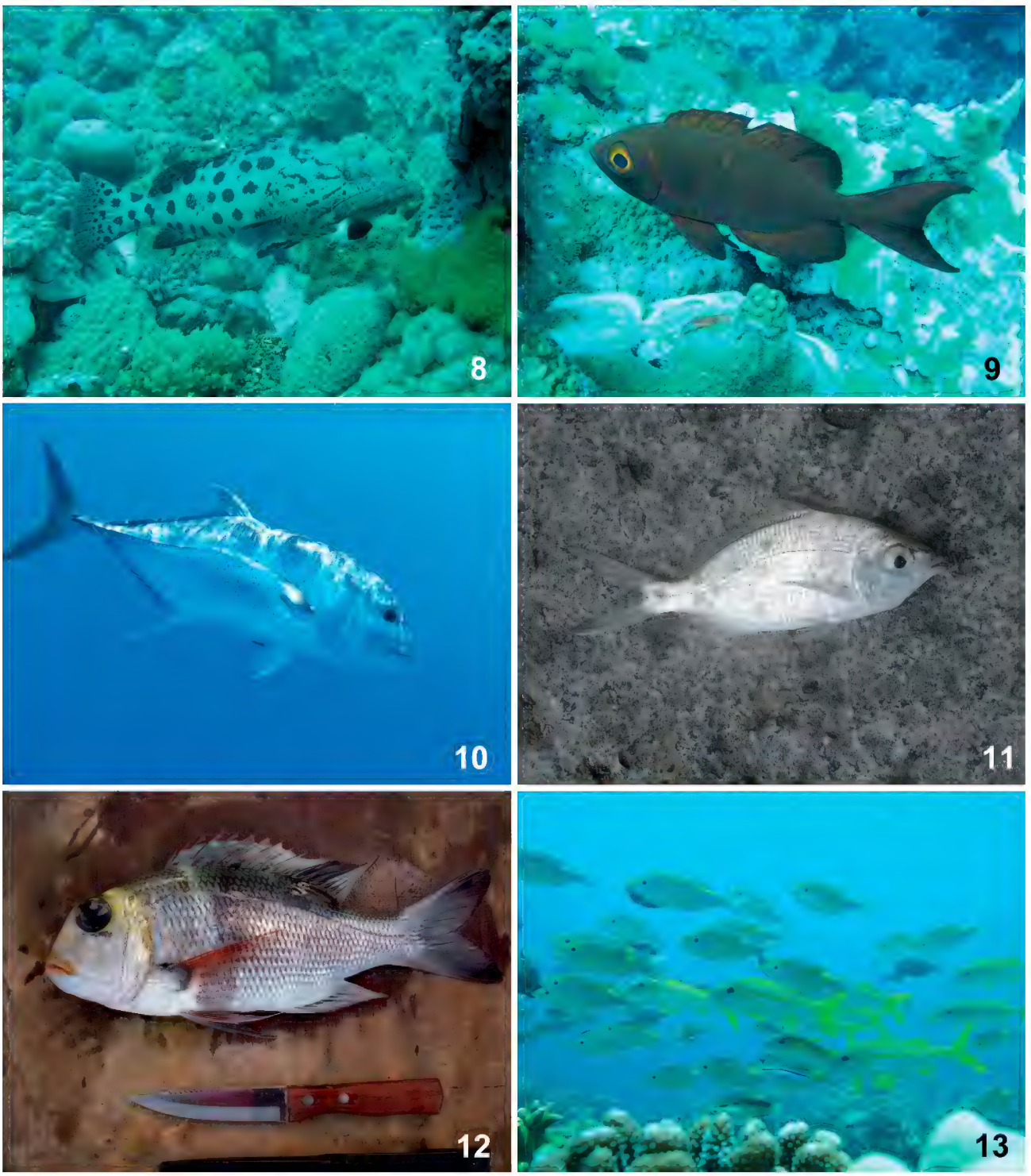
Scorpaenidae

Caracanthus madagascariensis (Guichenot, 1869) – Spotted croucher. – Distribution: First record from Europa Is-

Figs. 2–7. Europa Island (2–6) and shore fishes from this island (7, 8). – **2**. North coast with Gendarmerie building; photograph by P. Borsa, April 2011. **3**. West coast; aerial photograph by P. Borsa, April 2011. **4**. West coast; photograph by R. Fricke, 9 Nov. 2011. **5**. Inner lagoon; aerial photograph by P. Borsa, April 2011. **6**. *Gymnothorax pictus*; photograph by P. Borsa, 7 April 2011. **7**. *Strongylura leiura*; photograph by P. Borsa, 7 April 2011.

land as *Caracanthus zeylonicus* by Fourmanoir (1952: 187); record confirmed by P. Durville et al. during the expedition MD-11.

Pterois miles (Bennett, 1828) – Devil firefish; Poisson armée. – Distribution: Reported from Europa Island as *Pterois volitans* (non Linnaeus, 1758) by Fourmanoir (1952: 175);



Figs. 8–13. Shore fishes of Europa Island. – **8**. *Epinephelus tukula*; photograph by P. Durville, April 2011. **9**. *Priacanthus hamrur*; photograph by P. Durville, April 2011. **10**. *Caranx melampygus*; photograph by E. Bretagne, Oct. 2011. **11**. *Gerres longirostris*; photograph by P. Borsa, 7 April 2011. **12**. *Monotaxis grandoculis*; photograph by P. Borsa, 5 April 2011. **13**. *Mulloidichthys vanicolensis* (foreground) and *Gnathodentex aureolineatus* (background); also includes *Labroides dimidiatus* and *Gomphosus caeruleus* (below), and *Naso elegans* (background right); photograph by P. Durville, April 2011.

Figs. 14–19. Shore fishes of Europa Island. – **14**. *Chaetodon auriga*; photograph by P. Borsa, 6 April 2011. **15**. *Chaetodon trifasciatus*; photograph by P. Borsa, 6 April 2011. **16**. *Chaetodon xanthocephalus*; photograph by P. Borsa, 6 April 2011. **17**. *Pomacentrus caeruleus*; photograph by R. Fricke, 8 Nov. 2011. **18**. *Amblygobius semicinctus*; photograph by P. Durville, 11 Nov. 2011. **19**. *Sphyraena barracuda*; photograph by P. Borsa, 7 April 2011.

record confirmed by R. Fricke based on an observation at Europa on 7 Nov. 2011, St. B33.

Scorpaenodes guamensis (Quoy & Gaimard, 1824) – Guam scorpionfish. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 12 Nov. 2011, St. B28. – Material: SMF 34817 (2).

Scorpaenodes parvipinnis (Garrett, 1864) – Coral scorpionfish. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 9–12 Nov. 2011, St. B28. – Material: SMF 34735 (1), SMF 34777 (4), SMF 34818 (7).

Sebastapistes strongia (Cuvier in Cuvier & Valenciennes, 1829) – Barchin scorpionfish. – Distribution: First record from Europa Island as *Scorpaena kowiensis* and *Cantapus oglinus* by Fourmanoir (1952: 187).

Serranidae

Remarks: A record of *Epinephelus guaza* (non Linnaeus, 1758) by Fourmanoir (1952: 184) could not be identified to the species level.

Aethaloperca rogaa (Forsskål in Niebuhr, 1775) – Redmouth grouper; Vieille roga. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. EU3, EU7, B12, B14.

Cephalopholis argus Bloch & Schneider, 1801 – Peacock grouper, peacock rockcod; La prude (Réunion), mérou céleste (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 183); record confirmed by P. Durville et al. based on a observation at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU5, EU7, and by R. Fricke based on an observation and specimens collected on 11–12 Nov. 2011, St. B28, EU5. – Material: SMF 34778 (2), SMF 34819 (2).

Cephalopholis miniata (Forsskål in Niebuhr, 1775) – Coral hind, coral rockcod; Ananas batard (Réunion), vieille étoilée (France). – Distribution: First record from Europa Island as *Cephalopholis miniatus* by Fourmanoir (1952: 183); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B14, EU3.

Cephalopholis nigripinnis (Valenciennes in Cuvier & Valenciennes, 1828) – Darkfin hind; Vieille aile noire. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B12, B14, EU2, EU7. – Remarks: Closely related to *Cephalopholis urodeta* (Forster in Bloch & Schneider, 1801) which is restricted to the western Pacific.

Cephalopholis polleni (Bleeker, 1868) – Harlequin hind, harlequin rockcod; Cabot guignan (Réunion), vieille arlequin (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Cephalopholis sexmaculata (Rüppell, 1830) – Sixspot hind, sixblotch rockcod; Rouge l'allié (Réunion), vieille six taches (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B14, EU3, EU7.

Cephalopholis sonnerati (Valenciennes in Cuvier & Valenciennes, 1828) – Tomato hind, tomato rockcod; Rouge ananas, la prude rouge (Réunion), vieille ananas (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 183).

Epinephelus areolatus (Forsskål in Niebuhr, 1775) – Areolate grouper. – Distribution: First record from Europa Island by Fourmanoir (1952: 182).

Epinephelus coeruleopunctatus (Bloch, 1790) – White-spotted grouper; Loche à taches blanches. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Epinephelus coioides (Hamilton, 1822) – Orange-spotted grouper; Mérou à taches oranges. – Distribution: **New record** from Europa Island, based on an observation by P. Durville, 11 Nov. 2011, St. B14.

Epinephelus flavocaeruleus (Lacepède [ex Commerson], 1802) – Blue-and-yellow grouper; Le plat, platte ailes jaunes (Réunion), mérou faraud (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 183); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B5, EU4.

Epinephelus fuscoguttatus (Forsskål in Niebuhr, 1775) – Brown-marbled grouper, blotchy rockcod; Mérou marbré. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Epinephelus hexagonatus (Bloch & Schneider [ex Forster], 1801) – Star-spotted grouper; Maccabit, maccabit gris, risadel (Réunion), mérou mélifère (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also by R. Fricke based on an observation and a specimen collected on 11 Nov. 2011, St. B28, EU5; also observed by P. Durville, 12 Nov. 2011, St. B25. – Material: SMF 34779 (1).

Epinephelus maculatus (Bloch, 1790) – Highfin grouper; Loche de sable. – Distribution: First record from Europa Island by Fourmanoir (1952: 172).

Epinephelus merra Bloch, 1793 – Honeycomb grouper, dwarf spotted grouper; Maccabit, maccabit blanc (Réunion), griffin (Réunion, young specimens), plat gris (Réunion, adult specimens), mérou gateau de cire (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed by P. Durville et al. based on observations at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011, and by R. Fricke on 8–12 Nov. 2011, St. B28, B34; also observed by P. Durville, 12 Nov. 2011, St. B12. – Material: SMF 34820 (1).

Epinephelus oceanicus (Lacepède, 1802) – Indian Ocean blacktip grouper; Rougette (Réunion), mérou oriflamine (France). – Distribution: Reported from Europa Island as *Epinephelus fasciatus* (non Forsskål 1775) by Fourmanoir (1952: 184).

Epinephelus ongus (Bloch, 1790) – Specklefin grouper; Loche à taches claires. – Distribution: **New record** from Europa Island, based on a photograph taken by P. Chabanet on 12 Nov. 2011, St. B12.

Epinephelus polyphekadion (Bleeker, 1849) – Camouflage grouper; Loche crasseuse. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Epinephelus spilotoceps Schultz in Schultz, Herald, Lachner, Welander & Woods, 1953 – Foursaddle grouper, foursaddle rockcod; Mérou à quatre selles. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, EU2, EU5, EU7, and by R. Fricke on 11–12 Nov. 2011, St. EU5. – Material: SMF 34821 (1).

Epinephelus tauvina (Forsskål in Niebuhr, 1775) – Greasy grouper, greasy rockcod; Vieille lutre, vieille nègre (Réunion), mérou loutre (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11 Nov. 2011, St. B5.

Epinephelus tukula Morgans, 1959 – Potato grouper, potato bass; Mérou patate (Fig. 8). – Distribution: **New record** from Europa Island, based on observations by P. Durville et al. at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, B14, EU2, EU3, EU5, EU7; record confirmed based on photograph by E. Bretagne, taken in November 2011.

Gracila albomarginata (Fowler & Bean, 1930) – Slenderspine grouper; Vieille (Réunion), mérou bord rouge (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11–12 Nov. 2011, St. B12, B14.

Grammistes sexlineatus (Thunberg, 1792) – Sixstripe soapfish, skunkfish; Savonette (Réunion), savon rayes d'or (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34780 (1), SMF 34822 (2).

Nemanthias carberryi Smith, 1954 – Threadfin anthias. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. EU3, B5, B8, B12, B14.

Plectropomus laevis (Lacepède [ex Commerson], 1801) – Blacksaddle coral grouper; Mérou selle. – Distribution: **New record** from Europa Island; previously reported as *Plectropomus maculatus* (non Bloch, 1790) by Fourmanoir (1952: 183).

Plectropomus pessuliferus (Fowler, 1904) – Roving coral grouper; Mérou loche vagabonde. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Plectropomus punctatus (Quoy & Gaimard, 1824) – Marbled coral grouper. – Distribution: **New record** from Europa Island, based on an observation and a photograph by P. Durville, 11–12 Nov. 2011, St. B12, and among the mangroves in the inner lagoon.

Pseudanthias evansi (Smith, 1954) – Yellowback anthias, yellowtail goldie. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B14, EU7.

Pseudanthias squamipinnis (Peters, 1855) – Sea goldie. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU7.

Variola louti (Forsskål in Niebuhr, 1775) – Coronation grouper; Druide, rouge grand queue (Réunion), croissant queue jaune (France). – Distribution: First record from Europa Island by Fourmanoir (1952: pl. 11B); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU7.

Pseudochromidae

Chlidichthys johnvoelckeri Smith, 1953 – Cerise dottyback. – Distribution: **New record** from Europa Island, based on an observation as *Pseudochromis fridmani* (non Klausewitz, 1968) by P. Durville et al. during the expedition MD-11, a specimen collected by P. Durville & P. Chabanet on 10 Nov. 2011, St. B23, and a photograph taken by P. Durville on 7 Nov. 2011, St. EU7; also observed by P. Durville & P. Chabanet on 11 Nov. 2011, St. B14. – Material: SMF 34741 (1).

Teraponidae

Terapon jarbua (Forsskål in Niebuhr, 1775) – Jarbua, crescent-banded grunter, thornfish; Violon jarbua. – Distribution: **New record** from Europa Island; previously reported as *Therapon* sp. by Fourmanoir (1952: 170); record confirmed by P. Durville et al. during the expedition MD-11, a photograph taken by P. Borsa in the mangrove area on 7 April 2011, and by R. Fricke based on an observation at Europa on 7 Nov. 2011, St. B31.

Kuhliidae

Kuhlia mugil (Bloch & Schneider [ex Forster], 1801) – Barred flagtail; Hareng (Réunion), crocro drapeau (France). – Distribution: Reported from Europa Island as *Dules taeniurus* by Fourmanoir (1952: 170); record confirmed based on a specimen collected by R. Fricke on 11 Nov. 2011, St. B28; also observed by P. Durville, 12 Nov. 2011, St. B25. – Material: SMF 34758 (1).

Priacanthidae

Heteropriacanthus cruentatus (Lacepède, 1801) – Glasseye; Beau clair du large (Réunion), beau clair de roche (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Priacanthus hamrur (Forsskål in Niebuhr, 1775) – Moontail bullseye; Cardinal, beau clair (Réunion), beau clair miroir (France) (Fig. 9). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10–11 Nov. 2011, St. B8, B14.

Apogonidae

Remarks: A record of *Apogon novemfasciatus* by Fourmanoir (1952: 172) could not be identified to the species level.

Apogon semiornatus Peters, 1877 – Oblique-banded cardinalfish. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 12 Nov. 2011, St. B28. – Material: SMF 34786 (4).

Cheilodipterus artus Smith, 1961 – Wolf cardinalfish; Apogon strié. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Ostorhinchus apogonoides (Bleeker, 1856) – Shirt-tooth cardinalfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Ostorhinchus holotaenia (Regan, 1905) – Copperstriped cardinalfish. – Distribution: **New record** from Europa Island, based on a specimen collected by R. Fricke on 11 Nov. 2011, St. B28. – Material: SMF 34743 (1).

Ostorhinchus taeniophorus (Regan, 1908) – Reef-flat cardinalfish, ninestripe cardinal. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 9–12 Nov. 2011, St. B28; also observed and collected by P. Durville, 10–12 Nov. 2011, St. EU2, B25. – Material: SMF 34727 (2), SMF 34744 (2), SMF 34787 (8), SMF 34827 (2).

Pristiapogon kallopterus (Bleeker, 1856) – Iridescent cardinalfish, spinyhead cardinal. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed and photographed by P. Durville on 7 Nov. 2011, St. EU7.

Rhabdamia gracilis (Bleeker, 1856) – Luminous cardinalfish. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34745 (5), SMF 34788 (2).

Malacanthidae

Malacanthus latovittatus (Lacepède [ex Commerson], 1801) – Blue tilefish, blue blanquillo, striped blanquillo; Matajuel bleu. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Echeneidae

Echeneis naucrates Linnaeus, 1758 – Live sharksucker, shark remora; Pilote (Réunion). – Distribution: First record from Europa Island by Fourmanoir (1952: 187); record confirmed by P. Durville et al. during the expedition MD-11.

Remora remora (Linnaeus, 1758) – Common remora; Pilote (Réunion), rémora (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 187); record confirmed based on photograph by E. Bretagne, taken in November 2011.

Carangidae

Remarks: A record of *Chorinemus* sp. by Fourmanoir (1952: 186) could not identified to the species level.

Atule mate (Cuvier in Cuvier & Valenciennes, 1833) – Yellowtail scad; Carangue maté. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Carangoides fulvoguttatus (Forsskål in Niebuhr, 1775) – Yellow-spotted trevally, yellow-dotted trevally; Carangue pailletée. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Carangoides orthogrammus (Jordan & Gilbert, 1882) – Island trevally; Carangue des Îles. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11 Nov. 2011, St. B14.

Caranx ignobilis (Forsskål in Niebuhr, 1775) – Giant trevally; Carangue grosse tête (Réunion), carangue têtue (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 183); record confirmed by P. Durville et al. during the expedition MD-11, and based on photograph by E. Bretagne, taken in November 2011; also observed by P. Durville, 10–11 Nov. 2011, St. B5, B8, B14, EU2.

Caranx lugubris Poey, 1860 – Black kingfish, black jack; Carangue noire (France). – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Caranx melampygus Cuvier in Cuvier & Valenciennes, 1833 – Bluefin trevally, bluefin kingfish; Carangue bleu (Réunion), carangue aile bleue (France) (Fig. 10). – Distribution: First record from Europa Island as *Caranx stellatus* by Fourmanoir (1952: 174); record confirmed by P. Durville et al. based on observations at St. 1 and St. 2 (equals St. EU5 and St. B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, B14, B25, EU3, EU4, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Caranx sexfasciatus Quoy & Gaimard, 1825 – Bigeye trevally, bigeye kingfish; Carangue (Réunion), carangue vorace (France). – Distribution: **New record** from Europa Island; previously reported as *Caranx hippos* (non Linné, 1766) by Fourmanoir (1952: 186); record of *Caranx sexfasciatus* confirmed by P. Durville et al. during the expedition MD-11; also observed and photographed by P. Durville, 12 Nov. 2011, St. B12, and among the mangroves in the inner lagoon.

Caranx tille Cuvier in Cuvier & Valenciennes 1833 – Tille trevally; Carangue tille. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. EU7, and by R. Fricke on 8 Nov. 2011, St. B34.

Elagatis bipinnulata (Quoy & Gaimard, 1825) – Rainbow runner; Comète saumon. – Distribution: First record from Eu-

ropa Island as *Elagastis bipinnulatus* by FOURMANOIR (1952: 186); record confirmed by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 10 Nov. 2011, St. B8.

Scomberoides lysan (Forsskål in Niebuhr, 1775) – Double-spotted queenfish, leatherback; Pompre, sauteur sabre. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 12 Nov. 2011, St. B25.

Trachinotus blochii (Lacepède [ex Commerson], 1801) – Snubnose pompano; Pompaneau lune. – Distribution: First record from Europa Island as *Trachinotus Blochii* by FOURMANOIR (1952: 186); record confirmed by P. DURVILLE et al. based on a observation at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and by R. FRICKE based on an observation on 11 Nov. 2011, St. EU5; also observed by P. DURVILLE, 10–12 Nov. 2011, St. B8, B14, B25.

Lutjanidae

Aphareus furca (Lacepède [ex Commerson], 1801) – Blue smalltooth jobfish; Lantanier noir (Réunion), vivaneau tidents (France). – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU7.

Aprion virescens Valenciennes in Cuvier & Valenciennes, 1830 – Green jobfish; Thazard blanc (Réunion), vivaneau job (France). – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 9–11 Nov. 2011, St. B5, B8, B14, EU3.

Lutjanus argentimaculatus (Forsskål in Niebuhr, 1775) – River snapper, mangrove red snapper; Vivaneau des mangroves (France). – Distribution: First record from Europa Island as *Lutianus argentimaculatus* by FOURMANOIR (1952: 178); record confirmed by P. DURVILLE et al. based on a observation at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011, and by R. FRICKE on 8 Nov. 2011, St. B49; also observed by P. DURVILLE, 12 Nov. 2011, in a pond on the south side of the island.

Lutjanus bohar (Forsskål in Niebuhr, 1775) – Twinspot snapper; Vara-vara (Réunion), vivaneau chien rouge (France). – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU5, EU7.

Lutjanus fulviflamma (Forsskål in Niebuhr, 1775) – Dory snapper, blackspot snapper; Vivaneau gibelot (France). – Distribution: First record from Europa Island as *Lutianus fulviflamma* by FOURMANOIR (1952: 170); record confirmed by P. DURVILLE et al. during the expedition MD-11, and a photograph taken by P. BORSA in the mangrove area on 7 April 2011.

Lutjanus fulvus (Schneider [ex Forster] in Bloch & Schneider, 1801) – Yellow striped snapper, flametail snapper; Dorée (Réunion), vivaneau queue noire (France). – Distribution: First record from Europa Island as *Lutianus vaigiensis* by FOURMANOIR (1952: 174); record confirmed by P. DURVILLE et al. based on a observation at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011, an observation by P. BORSA in the mangrove area on 7 April 2011, and by R. FRICKE based on observations at Europa on 7–8 Nov. 2011, St. B31, B33, B34.

Lutjanus gibbus (Forsskål in Niebuhr, 1775) – Humpback snapper; Marie-Therèse (Réunion), vivaneau pagaie (France). – Distribution: First record from Europa Island as *Lutjanus gibbus* by FOURMANOIR (1952: 182); record confirmed by P. DURVILLE et al. based on a observation at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011, an observation by P. BORSA in the mangrove area on 7 April 2011, and by R. FRICKE based on an observation on 8–10 Nov. 2011, St. B34, B50; also observed by P. DURVILLE & P. CHABANET on 7–10 Nov. 2011, St. B8, EU7.

Lutjanus johnii (Bloch, 1792) – John's snapper. – Distribution: First record from Europa Island as *Lutianus Johni* by FOURMANOIR (1952: 170); record confirmed by R. FRICKE based on observations at Europa on 7–10 Nov. 2011, St. B31, B33, B34, B49, B50.

Lutjanus kasmira (Forsskål in Niebuhr, 1775) – Blue-banded snapper, blue-lined snapper; Le petite jaune (Réunion), vivaneau à raies bleues (France). – Distribution: First record from Europa Island as *Lutianus kasmira* by FOURMANOIR (1952: 184); record confirmed by P. DURVILLE et al. based on observations at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011, and by R. FRICKE on 8 Nov. 2011, St. B49.

Lutjanus lutjanus Bloch, 1790 – Bigeye snapper; Vivaneau gros yeux. – Distribution: First record from Europa Island as *Lutianus lineolatus* by FOURMANOIR (1952: 186).

Lutjanus monostigma (Cuvier in Cuvier & Valenciennes, 1828) – Onespot snapper; Vivaneau églefin. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7–11 Nov. 2011, St. B8, B14, EU5, EU7, and by R. FRICKE on 11 Nov. 2011, St. EU5.

Lutjanus rivulatus (Cuvier in Cuvier & Valenciennes, 1828) – Scribbled snapper, speckled snapper; Lèvre de boeuf, bonhomme tombé (Réunion), vivaneau maori (France). – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 10 Nov. 2011, St. B8.

Lutjanus sebae (Cuvier, 1816) – Emperor snapper; Vivaneau bourgeois. – Distribution: First record from Europa Island as *Lutianus sebae* by FOURMANOIR (1952: 184).

Macolor niger (Forsskål in Niebuhr, 1775) – Black snapper, black-and-white snapper; Vivaneau plate. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed and photographed by P. DURVILLE on 7–11 Nov. 2011, St. EU7, and among the mangroves in the inner lagoon.

Pristipomoides filamentosus (Valenciennes in Cuvier & Valenciennes, 1830) – Rosy jobfish, blue-spotted jobfish, crimson jobfish; Vivaneau commun, vivaneau blanc (Réunion), colas fil (France). – Distribution: First record from Europa Island by FOURMANOIR (1952: 184).

Caesionidae

Caesio caerulaurea Lacepède [ex Commerson], 1801 – Scissor-tailed fusilier; Maquereau (Réunion), caesio azuror (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Caesio lunaris Cuvier [ex Ehrenberg] in Cuvier & Valenciennes, 1830 – Blue fusilier; Caesio à croissant. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10–12 Nov. 2011, St. B5, B12, B14, EU2.

Caesio teres Seale, 1906 – Beautiful fusilier, yellowtail fusilier; Caesio à dos jaune et bleu. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, EU2, EU7.

Caesio xanthonota Bleeker, 1853 – Yellowback fusilier; Caesio à dos jaune. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B14, EU7; record confirmed based on photograph by E. Bretagne, taken in November 2011.

Pterocaesio chrysozona (Cuvier [ex Kuhl & Hasselt] in Cuvier & Valenciennes, 1830) – Goldband fusilier; Caesio ceinture d'or. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Pterocaesio pisang (Bleeker, 1853) – Banana fusilier; Caesio rose. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Ptercaesio tile (Cuvier in Cuvier & Valenciennes, 1830) – Bluestreak fusilier, dark-banded fusilier; Fusilier à ligne olive. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Gerreidae

Gerres longirostris (Lacepède, 1801) – Longtail silver-biddy; Blanche gouvernail (Fig. 11). – Distribution: **New record** from Europa Island, based on a photograph taken by P. Borsa during an expedition with R/V Marion Dufresne on 7 April 2011.

Gerres oyena (Forsskål in Niebuhr, 1775) – Common silverbiddy, common mojarra; Blanche commune. – Distribution: First record from Europa Island by Fourmanoir (1952: 170, pl. 12A); record confirmed by P. Durville et al. during the expedition MD-11, an observation by P. Borsa in the mangrove area on 7 April 2011, and by R. Fricke based on observations at Europa on 7–10 Nov. 2011, St. B28, B31, B33, B34, B37, B50.

Haemulidae

Diagramma picta (Thunberg, 1792) – Sailfin rubberlip; diagramme voilier. – Distribution: **New record** from Europa Island, based on photograph by E. Bretagne, taken in November 2011.

Plectorhinchus gaterinus (Forsskål in Niebuhr, 1775) – Blackspotted sweetlips; Gueule pavée (Réunion), diagramme moucheté (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Plectorhinchus obscurus (Günther, 1872) – Giant sweetlips; Loche casteix, lèvre en caoutchouc. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B8, B12, B14, B25, EU5, EU7, and in a pond on the south side of the island; and by R. Fricke on 11 Nov. 2011, St. EU5.

Plectorhinchus vittatus (Linnaeus, 1758) – Indian Ocean oriental sweetlips; Diagramme à bandes horizontales. – Distribution: **New record** from Europa Island, based on an observation as *Plectorhinchus orientalis* by P. Durville et al. during the expedition MD-11, and by R. Fricke on 11 Nov. 2011, St. EU5.

Sparidae

Acanthopagrus bifasciatus (Forsskål in Niebuhr, 1775) – Twobar seabream; Pagre double bande. – Distribution: First record from Europa Island by Fourmanoir (1952: 186).

Rhabdosargus sarba (Forsskål in Niebuhr, 1775) – Natal stumpnose, gold-lined seabream; Gueule pavée (Réunion), sargue doré (France). – Distribution: Recorded from Europa Island as *Acanthopagrus sarba* by Fourmanoir (1952: 174), and as *Rhabdosargus sarba* by Fourmanoir (1952: pl. 12B).

Lethrinidae

Gnathodentex aureolineatus (Lacepède [ex Commerson], 1802) – Yellowspot emperor, glowfish; Petit clair (Réunion), empereur strié (France) (Fig. 13). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Lethrinus nebulosus (Forsskål in Niebuhr, 1775) – Spangled emperor; Capitaine blanc (Réunion), empereur moris (France). – Distribution: **New record** from Europa Island, based on a photograph by P. Durville on 11 Nov. 2011 near the mangroves in the inner lagoon of Europa Island.

Lethrinus obsoletus (Forsskål in Niebuhr, 1775) – Orange-striped emperor; Bossu d'herbe. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and a photograph taken by P. Durville on 12 Nov. 2011, St. EU5.

Lethrinus olivaceus Valenciennes in Cuvier & Valenciennes, 1830 – Longface emperor; Bec de cane allongé, bec de cane malabar, lethrinus à museau long. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Lethrinus xanthochilus Klunzinger, 1870 – Yellowlip emperor; Empereur bec de cane. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10 Nov. 2011, St. B8, EU2.

Monotaxis grandoculis (Forsskål in Niebuhr, 1775) – Bigeye emperor, bigeye barenose; Gueule pavée (Réunion), empereur

bossu (France) (Fig. 12). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. and photograph by P. Borsa at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B8, B14, EU2, EU7.

Mullidae

Mulloidichthys ayliffe (Uiblein, 2011) – Western Indian Ocean yellowfin goatfish, Western Indian Ocean flame goatfish; Capucin queue jaune. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11. – Remarks: This is taxonomically the same species that was recorded from Réunion by Fricke et al. (2009: 68) as *Mulloidichthys auriflamma* (non Forsskål in Niebuhr, 1775).

Mulloidichthys flavolineatus (Lacepède [ex Commerson], 1801) – Yellowstripe goatfish; Capucin (Réunion), capuciva à bande jaune (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also photographed by P. Durville on 11 Nov. 2011 at Europa Island.

Mulloidichthys vanicolensis (Valenciennes in Cuvier & Valenciennes, 1831) – Yellowfin goatfish; Surmullet de Vanicolo (France) (Fig. 13). – Distribution: **New record** from Europa Island, based on a photograph by P. Durville on 11 Nov. 2011 near the mangroves of Europa Island.

Parupeneus barberinus (Lacepède [ex Commerson], 1801) – Dash-and-dot goatfish; Capucin sergent (Réunion), rouget-barbet barberin (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and on observations by R. Fricke on 7–11 Nov. 2011, St. B31, B37, B50, EU5; also observed by P. Durville, 12 Nov. 2011, St. EU5.

Parupeneus cyclostomus (Lacepède [ex Commerson], 1801) – Yellowsaddle goatfish; Capucin malbar (Réunion), rouget-barbet doré (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, EU3, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Parupeneus macronemus (Lacepède [ex Commerson], 1801) – Longbarbel goatfish, band-dot goatfish; Rouget-barbet bandeau. – Distribution: First record from Europa Island as *Pseudopeneus macronema* by Fourmanoir (1952: 184); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. EU3, B5, B14, EU2.

Parupeneus pleurostigma (Bennett, 1831) – Blackspot goatfish, sidespot goatfish; Rouget-barbet pastille. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Parupeneus trifasciatus (Lacepède [ex Commerson], 1801) – Two-barred goatfish; Capucin (Réunion), rouget-barbet double-tache (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU5, EU7, and by R. Fricke on 10–11 Nov. 2011, St. B50, EU5.

Pempheridae

Parapriacanthus ransonneti Steindachner, 1870 – Slender sweeper, pygmy sweeper. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Pempheris sp. (aff. *Pempheris nesogallica* Cuvier in Cuvier & Valenciennes, 1831). – Distribution: Observed at Europa Island by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Pempheris schwenkii Bleeker, 1855 – Blackstripe sweeper. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Kyphosidae

Kyphosus bigibbus Lacepède [ex Commerson], 1801 – Grey chub, brown chub. – Distribution: **New record** from Europa Island, based on a photograph taken by E. Bretagne in Oct. 2011, a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon, and on observations by R. Fricke on 10–11 Nov. 2011, St. B50, EU5.

Kyphosus cinerascens (Forsskål in Niebuhr, 1775) – Blue seachub, lowfin rudderfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; previously listed as *Kyphosus* sp. by Fourmanoir (1952: 170); also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. EU7, B25.

Monodactylidae

Monodactylus argenteus (Linnaeus, 1758) – Silver moony, mono, Natal moony; Poisson lune argenté. – Distribution: First record from Europa Island by Fourmanoir (1952: 174); record confirmed by P. Durville et al. during the expedition MD-11, and a photograph taken by P. Borsa in the mangrove area on 7 April 2011; also observed by P. Durville, 12 Nov. 2011, in a pond on the south side of the island.

Chaetodontidae

Chaetodon auriga Forsskål in Niebuhr, 1775 – Threadfin butterflyfish (Fig. 14). – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed by P. Durville et al. based on a observation at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and an observation by P. Borsa in the mangrove area on 7 April 2011; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU5, EU7, and by R. Fricke on 8–10 Nov. 2011, St. B34, B37, B49, B50.

Chaetodon bennetti Cuvier in Cuvier & Valenciennes, 1831 – Bluelashed butterflyfish; Papillon de Bennett. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7–9 Nov. 2011, St. EU3, EU7.

Chaetodon falcula Bloch, 1795 – Blackwedged butterflyfish; Papillon indien à deux selles. – Distribution: **New re-**

cord from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and by R. Fricke on 11 Nov. 2011, St. EU5; also observed by P. Durville, 10 Nov. 2011, St. EU2.

Chaetodon guttatissimus Bennett, 1833 – Peppered butterflyfish, spotted butterflyfish, gorgeous gussy; Chétodon moucheté. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B8, B12, B14, EU2, EU3, EU7.

Chaetodon interruptus Ahl, 1923 – Teardrop butterflyfish, limespot butterflyfish; Chétodon à tache de citron. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, EU2, EU3, EU5.

Chaetodon kleinii Bloch, 1790 – Klein's butterflyfish, whitespotted butterflyfish; Papillon (Réunion). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and by R. Fricke on 10 Nov. 2011, St. B37.

Chaetodon lineolatus Cuvier [ex Quoy & Gaimard] in Cuvier & Valenciennes, 1831 – Lined butterflyfish; Chétodon linéolé. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 7–10 Nov. 2011, St. B31, B50; also observed by P. Durville, 10 Nov. 2011, St. B8.

Chaetodon lunula (Lacepède [ex Commerson], 1802) – Racoon butterflyfish, halfmoon butterflyfish; Chétodon à croissant. – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed by P. Durville et al. during the expedition MD-11; and by R. Fricke based on observations and specimens collected at Europa on 7–12 Nov. 2011, St. B28, B31, B33, B34, B37, B50, EU5; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, B25, EU2, EU3, EU5, EU7. – Material: SMF 34751 (1), SMF 34794 (2).

Chaetodon madagaskariensis Ahl, 1923 – Pearly butterflyfish; Chétodon de Madagascar. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Chaetodon melannotus Bloch & Schneider, 1801 – Black-backed butterflyfish; Chétodon à dos noir. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Chaetodon meyeri Schneider [ex Renard] in Bloch & Schneider, 1801 – Meyer's butterflyfish, scrawled butterflyfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. EU3, EU4, EU7, B5, B8, B12, B14, EU2, EU5.

Chaetodon trifascialis Quoy & Gaimard, 1825 – Chevroned butterflyfish, rightangle butterflyfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, EU2, EU3, EU7.

Chaetodon trifasciatus Park, 1797 – Redfin butterflyfish, purple butterflyfish, melon butterflyfish (Fig. 15). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and on an observation by R. Fricke on 7–11 Nov. 2011, St. B31, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B12, B14, EU5, EU7.

Chaetodon vagabundus Linnaeus, 1758 – Vagabond butterflyfish; Chétodon à vagabond. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and by R. Fricke on 11 Nov. 2011, St. EU5; also observed by P. Durville, 12 Nov. 2011, St. B12, EU5.

Chaetodon xanthocephalus Bennett, 1833 – Yellowhead butterflyfish; Chétodon à tête jaune (Fig. 16). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and by R. Fricke based on an observation at Europa on 7–11 Nov. 2011, St. B33, B50, EU5; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, EU2, EU3, EU7.

Chaetodon zanzibarensis Playfair in Playfair & Günther, 1867 – Zanzibar butterflyfish; Chétodon de Zanzibar. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Forcipiger flavissimus Jordan & McGregor in Jordan & Evermann, 1898 – Long-nosed butterflyfish; Papillon longnez. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. B8, EU3.

Hemitaurichthys zoster (Bennett, 1831) – Black pyramid butterflyfish, brushtooth butterflyfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Heniochus acuminatus (Linnaeus, 1758) – Coachman, longfin bannerfish; Pavillon (Réunion). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11–12 Nov. 2011, St. B5, B12, B14.

Heniochus monoceros Cuvier in Cuvier & Valenciennes, 1831 – Masked bannerfish, masked coachman; Pavillon (Réunion), hénioche cornu (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10–11 Nov. 2011, St. B5, EU2.

Pomacanthidae

Apolemichthys trimaculatus (Cuvier [ex Lacepède] in Cuvier & Valenciennes, 1831) – Threespot angelfish, flagfin angelfish; Poisson-ange à trois taches. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, B8, EU3, EU4, EU7.

Centropyge acanthops (Norman, 1922) – African pygmy angelfish, jumping bean, orangeback angelfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Centropyge bispinosa (Günther, 1860) – Coral beauty; Poisson-ange à deux épines. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10–11 Nov. 2011, St. B8, B14, EU2.

Centropyge multispinis (Playfair in Playfair & Günther, 1867) – Dusky angelfish, dusky cherub. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU7, and by R. Fricke on 10–11 Nov. 2011, St. B50, EU5.

Pomacanthus chrysurus (Cuvier in Cuvier & Valenciennes, 1831) – Goldtail angelfish; Poisson-ange à oreille tachée. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Pomacanthus imperator (Bloch, 1787) – Emperor angelfish; Poisson-ange impérial; Poisson-ange imérial. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B14, EU3, EU5, EU7.

Pomacanthus semicirculatus (Cuvier in Cuvier & Valenciennes, 1831) – Semicircle angelfish; Poisson-ange bleu. – Distribution: **New record** from Europa Island, based on an observation by P. Durville, 10–11 Nov. 2011, St. B5, B8.

Pygoplites diacanthus (Boddaert, 1772) – Regal angelfish; Poisson-ange à bandes bleues, poisson duc. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B12, B14, EU2, EU7.

Cirrhitidae

Remarks: A record of *Paracirrhites* sp. by Fourmanoir (1952: 183) could not be identified to the species level.

Amblycirrhitus bimacula (Jenkins, 1903) – Twospot hawkfish. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B5, EU4.

Cirrhitichthys oxycephalus (Bleeker, 1855) – Coral hawkfish; Épervier lutin. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed and photographed by P. Durville on 7–12 Nov. 2011, St. EU3, B12, B14, EU4, EU5, EU7, and by R. Fricke on 9 Nov. 2011, St. B28.

Cirrhitus pinnulatus (Bloch & Schneider [ex Forster], 1801) – Stocky hawkfish; Domingue (Réunion). – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 9 Nov. 2011, St. B28, and by a photograph by P. Chabanet on the NE side of the island.

Paracirrhites arcatus (Cuvier [ex Parkinson] in Cuvier & Valenciennes, 1829) – Arc-eye hawkfish, horseshoe hawkfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU5, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Paracirrhites forsteri (Schneider in Bloch & Schneider, 1801) – Freckled hawkfish, blackside hawkfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU5, EU7.

Pomacentridae

Abudefduf notatus (Day, 1870) – Yellowtail sergeant. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed and collected by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B25, EU7, and in a pond on the south side of the island; and by R. Fricke based on an observation and specimens collected on 9–11 Nov. 2011, St. B28. – Material: SMF 34732 (1), SMF 34771 (1), SMF 34835 (1).

Abudefduf septemfasciatus (Cuvier in Cuvier & Valenciennes, 1830) – Banded sergeant, sevenbar damsel; Sergent-major. – Distribution: **New record** from Europa Island, based on an observation and a photograph by P. Durville, 12 Nov. 2011, St. B25.

Abudefduf sexfasciatus (Lacepède [ex Commerson], 1801) – Scissortail sergeant, stripetail damsel. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Abudefduf sordidus (Forsskål in Niebuhr, 1775) – Blackspot sergeant, spot damsel; Sergent à tache noire. – Distribution: First record from Europa Island by Fourmanoir (1952: 170); record confirmed by P. Durville et al. based on a observation at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, an observation by P. Borsa in the mangrove area on 7 April 2011, and by R. Fricke on 9 Nov. 2011, St. B28; also observed by P. Durville, 12 Nov. 2011, St. B25.

Abudefduf sparoides (Quoy & Gaimard, 1825) – False-eye sergeant, false-eye damsel. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011; record confirmed by R. Fricke based on observations on 7–10 Nov. 2011, St. B28, B32, B33, B34, B37, B49.

Abudefduf vaigiensis (Quoy & Gaimard, 1825) – Indo-Pacific sergeant. – Distribution: **New record** from Europa Island, previously reported as *A. saxatilis* (non Linnaeus, 1758) by Fourmanoir (1952: 170); record confirmed by P. Durville et al. based on a observation at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and by R. Fricke based on observations and specimens collected at Europa on 7–12 Nov. 2011, St. B28, B31, B32; also observed by P. Durville, 12 Nov. 2011, St. B25. – Material: SMF 34733 (2), SMF 34772 (1), SMF 34813 (1).

Amphiprion akallopisos Bleeker, 1853 – Skunk clownfish; Poisson-clown mouflette. – Distribution: **New record** from Europa Island, based on the observation of a single specimen by P. Durville et al. during the expedition MD-11. – Remarks: This is the most common species of anemonefish at Europa Island.

Amphiprion allardi Klausewitz, 1970 – Twobar anemonefish, Allard's anemonefish; Poisson-clown d'Allard. – Distribution: **New record** from Europa Island; previously listed as *A. polymnus* (non Linnaeus, 1758) by Fourmanoir (1952: 186); observed at Europa Island by P. Durville et al. during the expedition MD-11.

Amphiprion latifasciatus Allen, 1972 – Madagascar anemonefish; Poisson-clown de Madagascar. – Distribution: **New record** from Europa Island, based on a single specimen by P. Durville et al. during the expedition MD-11.

Chromis agilis Smith, 1960 – Reef chromis, agile chromis. – Distribution: **New record** from Europa Island, based on an observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Chromis dimidiata (Klunzinger, 1871) – Chocolate dip; Demoiselle bicolore. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU5, EU7, and by R. Fricke on 8–11 Nov. 2011, St. B49, B50, EU5.

Chromis nigrura Smith, 1960 – Blacktail chromis. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU5, EU7.

Chromis opercularis (Günther in Playfair & Günther, 1867) – Doublebar chromis. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU7.

Chromis ternatensis (Bleeker, 1856) – Golden chromis, blue-green chromis. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed and photographed by P. Durville on 7–12 Nov. 2011, St. B12, B14, EU7.

Chromis viridis Cuvier [ex Ehrenberg] in Cuvier & Valenciennes, 1830 – Green chromis, blue-green chromis; Petit cafre (Réunion), demoiselle bleue (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, on photographs by P. Durville and P. Chabanet taken in Nov. 2011, and on an observation by R. Fricke on 7–8 Nov. 2011, St. B31, B34, B49.

Chromis weberi Fowler & Bean, 1928 – Weber's chromis. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed and photographed by P. Durville on 7 Nov. 2011, St. EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Chrysiptera brownriggii (Bennett, 1828) – Surge demoiselle, blueribbon demoiselle. – Distribution: **New record** from Europa Island, based on observations by P. Durville et al. at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011, and by R. Fricke on 7–11 Nov. 2011, St. B28, B31, B32, B33, B34, B37, B49, B50, EU5; also observed by P. Durville, 12 Nov. 2011, St. B25, EU5; previously listed as *Abudefduf biocellatus* (non Quoy & Gaimard, 1825) by Fourmanoir (1952: 172).

Chrysiptera glauca (Cuvier in Cuvier & Valenciennes, 1830) – Grey demoiselle, blue damsel. – Distribution: **New record** from Europa Island, based on observations by P. Durville et al. at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011, and on observations and specimens collected by R. Fricke on 7–12 Nov. 2011, St. B28, B31, B34, B37, B50, EU5; also observed by P. Durville, 12 Nov. 2011, St. B25. – Material: SMF 34734 (1), SMF 34773 (1), SMF 34814 (6).

Chrysiptera unimaculata (Cuvier in Cuvier & Valenciennes, 1830) – Onespot demoiselle; Demoiselle à une tache. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and on observations and specimens collected by R. Fricke on 7–12 Nov. 2011, St. B28, B31, B32, B33, B34, B37, B49, B50, EU5; also observed by P. Durville, 12 Nov. 2011, St. B25, EU5. – Material: SMF 34774 (1), SMF 34815 (10).

Dascyllus aruanus (Linnaeus, 1758) – Humbug dascyllus, zebra humbug, whitetail dascyllus; Demoiselle à queue blanche. – Distribution: First record from Europa Island as *Dascyllus aruanus* by Fourmanoir (1952: 174), and as *Dascyllus amanius* by Fourmanoir (1952: 186); record confirmed by P. Durville et al. based on a observation at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and by R. Fricke based on observations at Europa on 7–10 Nov. 2011, St. B31, B32, B33, B34, B37, B49, B50.

Dascyllus carneus Fischer, 1885 – Twobar humbug, cloudy dascyllus. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011, on the north side of the island below the boat mooring, at 18 m depth.

Dascyllus trimaculatus (Rüppell, 1829) – Domino, threespot dascyllus; Demoiselle à trois taches. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 2 (equals St. B34 of this paper) during an expedition with R/V Marion Dufresne on 6 April 2011, and by R. Fricke on 8–10 Nov. 2011, St. B34, B37, B50; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, EU7.

Lepidozygus tapeinosoma (Bleeker, 1856) – Fusilier damselfish; Poisson demoiselle bleu à dos jaune. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B8, B12, B14, EU2, EU3, EU4.

Neopomacentrus fuliginosus (Smith, 1960) – African demoiselle. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Plectroglyphidodon dickii (Liénard, 1839) – Narrowbar damsel, Dick's damsel, blackbar devil; Demoiselle de Dick. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov.

2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU5, EU7, and by R. FRICKE on 8–11 Nov. 2011, St. B49, EU5.

Plectroglyphidodon imparipennis (Sauvage in Vaillant & Sauvage, 1875) – Brighteye damsel, stop-start damsel. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11, and on observations and specimens collected by R. FRICKE on 7–12 Nov. 2011, St. B28, B32, EU5; also observed by P. DURVILLE, 12 Nov. 2011, St. B25, EU5. – Material: SMF 34775 (2), SMF 34816 (1).

Plectroglyphidodon johnstonianus Fowler & Ball, 1924 – Johnston damsel, widebar damsel. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7–12 Nov. 2011, St. B5, B12, B14, EU2, EU3, EU4, EU7, and by R. FRICKE on 8–11 Nov. 2011, St. B49, B50, EU5.

Plectroglyphidodon lacrymatus (Quoy & Gaimard, 1825) – White-spotted devil; Bouteur perlée. – Distribution: **New record** from Europa Island, based on a photograph by P. DURVILLE taken on 12 Nov. 2011, St. EU5.

Plectroglyphidodon phoenixensis (Schultz, 1943) – Phoenix devil. – Distribution: **New record** from Europa Island, based on an photograph by P. CHABANET taken on 10 Nov. 2011, St. B23, and an observation and a specimen collected by R. FRICKE on 11 Nov. 2011, St. B28, EU5; also observed by P. DURVILLE, 12 Nov. 2011, St. B25. – Material: SMF 34776 (1).

Pomacentrus agassizii Bliss, 1883 – Creole damsel. – Distribution: **New record** from Europa Island; previously listed as *Pomacentrus tripunctatus* (non Cuvier in Cuvier & Valenciennes, 1830) by FOURMANOIR (1952: 172).

Pomacentrus caeruleus Quoy & Gaimard, 1825 – Caerulean damsel; Bouteur bleu et jaune (Fig. 17). – Distribution: **New record** from Europa Island, based on an observation and specimens collected by R. FRICKE on 8–10 Nov. 2011, St. B34, B37, B50; also a photograph by P. DURVILLE, taken on 12 Nov. 2011, St. EU5.

Pomacentrus pavo (Bloch, 1787) – Sapphire damsel; Bouteur paon. – Distribution: **New record** from Europa Island, based on an observation and a photograph by P. CHABANET on 12 Nov. 2011, in the mangrove area in the inner lagoon of Europa Island.

Stegastes luteobrunneus (Smith, 1960) – Indian Ocean dark damsel. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11, and on observations by R. FRICKE on 7–11 Nov. 2011, St. B31, B32, B34, B49, EU5.

Stegastes nigricans (Lacepède [ex Commerson], 1802) – Dusky gregory; Négrillon. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11.

Stegastes pelicieri Allen & Emery, 1985 – Mauritian gregory. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU5, EU7, and by R. FRICKE on 8–11 Nov. 2011, St. B37, B49, B50, EU5.

Labridae

Anampses caeruleopunctatus Rüppell, 1829 – Blue-spotted wrasse, blue-spotted tamarin; Labre constellé (female), labre bleu (male). – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 10–12 Nov. 2011, St. B5, B8, B12, B14, EU2.

Anampses meleagrides Valenciennes in Cuvier & Valenciennes, 1840 – Yellowtail tamarin; Labre à queue jaune. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 10–12 Nov. 2011, St. B8, B12, B14.

Bodianus anthioides (Bennett, 1832) – Lyretail hogfish; Labre lyre. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7 Nov. 2011, St. EU7.

Bodianus axillaris (Bennett, 1832) – Axilspot hogfish, turncoat hogfish; Labre à tache pectorale. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE & P. CHABANET on 7–11 Nov. 2011, St. B5, B8, B14, EU2, EU7.

Bodianus bilunulatus (Lacepède [ex Commerson], 1801) – Saddleback hogfish; Vieille à selle noire. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11, and on an observation by R. FRICKE on 7 Nov. 2011, St. B32; also observed by P. DURVILLE & P. CHABANET on 9–12 Nov. 2011, St. B12, EU3.

Bodianus diana (Lacepède [ex Commerson], 1801) – Diana's hogfish; Labre diane. – Distribution: First record from Europa Island as *Lepidaploïs diana* by FOURMANOIR (1952: 184); record confirmed by P. DURVILLE et al. during the expedition MD-11; also observed and photographed by P. DURVILLE on 7–12 Nov. 2011, St. B12, B14, EU2, EU5, EU7.

Cheilinus chlorourus (Bloch, 1791) – Floral wrasse; Vieille tachetée. – Distribution: **New record** from Europa Island, based on juvenile specimens collected by R. FRICKE on 11–12 Nov. 2011, St. B28. – Material: SMF 34759 (1), SMF 34801 (1).

Cheilinus fasciatus (Bloch, 1791) – Red-breasted wrasse; Vieille rayée. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 12 Nov. 2011, St. EU5.

Cheilinus oxycephalus Bleeker, 1853 – Snooty wrasse; Vieille à bec pointu. – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11; also observed by P. DURVILLE, 10 Nov. 2011, St. EU2.

Cheilinus trilobatus Lacepède [ex Commerson], 1801 – Tripletail wrasse; Lachaux (Réunion), vieille triple queue, vieille trilobé (France). – Distribution: **New record** from Europa Island, based on an observation by P. DURVILLE et al. during the expedition MD-11, and by R. FRICKE on 10–11 Nov. 2011, St. B50, EU5; also observed by P. DURVILLE, 11 Nov. 2011, St. B5.

Cheilinus undulatus Rüppell, 1835 – Humphead wrasse; Napoléon. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; record confirmed based on photograph by E. Bretagne, taken in November 2011; also observed by P. Durville, 12 Nov. 2011, St. B12.

Cirrhilabrus exquisitus Smith, 1957 – Exquisite wrasse; Labre exquis. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B12, B14, EU2, EU3.

Coris aygula Lacepède [ex Commerson], 1801 – Clown coris; Loupe côte (Réunion), clarisse clown (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10 Nov. 2011, St. EU2.

Coris caudimacula (Quoy & Gaimard, 1834) – Spottail coris; Girelle à tache caudale. – Distribution: **New record** from Europa Island, based on a photograph taken by P. Durville on 12 Nov. 2011, St. EU5.

Coris cuvieri (Bennett, 1831) – African coris; Clarisse africaine. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, by R. Fricke on 11 Nov. 2011, St. EU5, and on a photograph of a juvenile taken by P. Durville, St. EU6; also observed by P. Durville, 10 Nov. 2011, St. B8.

Cymolutes praetextatus (Quoy & Gaimard, 1834) – Knife wrasse, knife razorfish. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Epibulus insidiator (Pallas, 1770) – Slingjaw wrasse; Epibule gourami. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11 Nov. 2011, St. B14.

Gomphosus caeruleus Lacepède [ex Commerson], 1801 – Indian Ocean bird wrasse, birdfish; Poisson oiseau (Fig. 13). – Distribution: First record from Europa Island as *Gomphosus coerulens*, *Gomphosus varius* and *Gomphosus* sp. by Fourmanoir (1952: 184); record confirmed by P. Durville et al. based on a observation at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011, and by R. Fricke based on observations at Europa on 7–11 Nov. 2011, St. B28, B31, B32, B33, B34, B37, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU5.

Halichoeres cosmetus Randall & Smith, 1982 – Adorned wrasse; Girelle à raies d'or. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B12, EU2, EU3.

Halichoeres hortulanus (Lacepède [ex Commerson], 1801) – Checkerboard wrasse; Bonpartère (Réunion), lalo damier (France). – Distribution: First record from Europa Island as *Halichoeres centriquadrus* by Fourmanoir (1952: 184); record confirmed by P. Durville et al. during the expedition MD-11, and by R. Fricke based on an observation at Europa on 7–11 Nov. 2011, St. B28, B31, B32, B34, B37, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU5, EU7.

Halichoeres lapillus Smith, 1947 – Jewelled wrasse; Girelle à petits cailloux. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 8 Nov. 2011, St. B34.

Halichoeres nebulosus (Valenciennes in Cuvier & Valenciennes, 1839) – Nebulous wrasse; Girelle nébuleuse. – Distribution: **New record** from Europa Island, based on observations and specimens collected by R. Fricke on 8–11 Nov. 2011, St. B28, B34, B37, B50, EU5, and a specimen collected by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34730 (1), SMF 34760 (2), SMF 34834 (1).

Halichoeres nigrescens (Bloch & Schneider, 1801) – Bubblefin wrasse. – Distribution: **New record** from Europa Island, based on an observation and specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28, EU5. – Material: SMF 34761 (3), SMF 34802 (1).

Halichoeres scapularis (Bennett, 1832) – Zigzag wrasse; Girelle en arc-en-ciel. – Distribution: **New record** from Europa Island, based on an observation and a specimen collected by R. Fricke at Europa on 7–12 Nov. 2011, St. B28, B33. – Material: SMF 34762 (1), SMF 34803 (1).

Halichoeres trispilus Randall & Smith, 1982 – Threespot wrasse; Girelle trois points. – Distribution: **New record** from Europa Island, based on observations by R. Fricke at Europa on 7–11 Nov. 2011, St. B31, B33, B34, B37, B49, B50, EU5.

Hemigymnus fasciatus (Bloch, 1792) – Barred thicklip wrasse; Chien noir (Réunion), tamarin à bandes noires (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU7.

Hologymnosus annulatus (Lacepède [ex Commerson], 1801) – Ring wrasse; Labre annelé. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke at Europa on 10 Nov. 2011, St. B50; also observed by P. Durville, 11 Nov. 2011, St. B14.

Labrichthys unilineatus (Guichenot, 1847) – Tubelip wrasse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville, 11 Nov. 2011, St. B14.

Labroides bicolor Fowler & Bean, 1928 – Bicoloured cleaner wrasse; Poisson nettoyeur bicolore. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B12, B14, EU2, EU3, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Labroides dimidiatus (Valenciennes in Cuvier & Valenciennes, 1839) – Bluestreak cleaner wrasse; Poisson nettoyeur commun (Fig. 13). – Distribution: First record from Europa Island as *Fissilabrus dimidiatus* by Fourmanoir (1952: 172); record confirmed by P. Durville et al. during the expedition MD-11, and by R. Fricke based on observations at Europa on 7–10 Nov. 2011, St. B31, B32, B33, B34, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, EU2, EU3, EU5, EU7.

Labropsis xanthonota Randall, 1981 – Wedge-tailed wrasse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11 Nov. 2011, St. B14.

Macropharyngodon bipartitus Smith, 1957 – Vermiculate wrasse, divided wrasse; Girelle diamant. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 12 Nov. 2011, St. B12.

Oxycheilinus digrammus (Lacepède [ex Commerson], 1801) – Cheek-lined wrasse, bandcheek wrasse; Vieille barbe noire. – Distribution: First record from Europa Island as *Cheilinus diagrammus* by Fourmanoir (1952: 184); record confirmed by P. Durville, based on an observation on 7–10 Nov. 2011, St. B8, EU7.

Pseudocheilinus dispilus Randall, 1999 – Mascarene sixstripe wrasse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; collected by P. Durville & P. Chabanet on 8–9 Nov. 2011, St. EU3, EU4, 6; also observed by P. Durville & P. Chabanet on 10–12 Nov. 2011, St. B5, B8, B12, EU2.

Pseudocheilinus octotaenia Jenkins, 1901 – Eight-lined wrasse. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Pseudodax moluccanus (Valenciennes in Cuvier & Valenciennes, 1840) – Chiseltooth wrasse; Vieille ciseau. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10–11 Nov. 2011, St. B8, B14, EU2.

Pteragogus flagellifer (Valenciennes in Cuvier & Valenciennes, 1839) – Cocktail wrasse. – Distribution: First record from Europa Island as *Duymaeria flagellifera* by Fourmanoir (1952: 184), and as *Callyodon flagellifera* by Fourmanoir (1952: 187); record confirmed by R. Fricke based on observations at Europa on 7–10 Nov. 2011, St. B31, B50; also observed by P. Durville, 11 Nov. 2011, St. B14. – Material: SMF 34740 (1).

Stethojulis albovittata (Bonnaterre [ex Koelreuther], 1788) – Blue-lined wrasse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and on observations and specimens collected by R. Fricke on 7–12 Nov. 2011, St. B28, B32, B37, B50, EU5; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B25, EU3, EU4, EU5; previously listed as *Stethojulis* sp. by Fourmanoir (1952: 172). – Material: SMF 34763 (4), SMF 34804 (7).

Thalassoma amblycephalum (Bleeker, 1856) – Twotone wrasse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and by R. Fricke on 8–12 Nov. 2011, St. B28, B37, B49, B50, EU5. – Material: SMF 34805 (2).

Thalassoma genivittatum (Valenciennes in Cuvier & Valenciennes, 1839) – Redcheek wrasse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B12, B14, B25, EU2, EU3, EU4, EU5, EU7.

Thalassoma hardwicke (Bennett, 1830) – Sixbar wrasse; Girelle à six bandes. – Distribution: First record from Europa Island as *Thalassoma hardwicki* by Fourmanoir (1952: 170), and as *Thalassoma hardwickei* by Fourmanoir (1952: 187); record confirmed by P. Durville et al. during the expedition MD-11, and by R. Fricke based on observations at Europa on 7–11 Nov. 2011, St. B28, B31, B32, B33, B34, B49, B50, EU5; also observed by P. Durville, 12 Nov. 2011, St. EU5.

Thalassoma hebraicum (Lacepède [ex Commerson], 1801) – Goldbar wrasse. – Distribution: First record from Europa Island as *Thalassoma hebraïcum* by Fourmanoir (1952: 184); record confirmed by P. Durville et al. during the expedition MD-11; also observed and a specimen collected by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B25, EU2, EU3, EU4, EU5, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Thalassoma lunare (Linnaeus, 1758) – Moon wrasse; Girelle verte. – Distribution: First record from Europa Island by Fourmanoir (1952: 184); record confirmed by P. Durville et al. during the expedition MD-11, and by R. Fricke based on observations at Europa on 7–11 Nov. 2011, St. B31, B33, B34, B37, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, B14, EU7.

Thalassoma purpureum (Forsskål in Niebuhr, 1775) – Surge wrasse; Girelle hublot. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Thalassoma quinquevittatum (Lay & Bennett, 1839) – Fivestripe wrasse. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke based on observations on 7–11 Nov. 2011, St. B28, B32, EU5.

Thalassoma trilobatum (Lacepède [ex Commerson], 1801) – Ladder wrasse, Christmas wrasse; Calonnier côte (Réunion), girelle de Noël (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28; also observed by P. Durville, 12 Nov. 2011, St. B25. – Material: SMF 34764 (2), SMF 34806 (1).

Wetmorella nigropinnata (Seale, 1901) – Sharpnose wrasse. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Scaridae

Calotomus carolinus (Valenciennes in Cuvier & Valenciennes, 1840) – Stareye parrotfish, Christmas parrotfish, bucktooth parrotfish; Perroquet des Carolines. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Chlorurus sordidus (Forsskål in Niebuhr, 1775) – Bullethead parrotfish, daisy parrotfish; Perroquet marguerite. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU7, and by R. Fricke on 8–10 Nov. 2011, St. B34, B37, B50.

Chlorurus strongylocephalus (Bleeker, 1854) – Steephead parrotfish; Perroquet vert (Réunion). – Distribution: **New**

record from Europa Island, based on an observation by P. Durville et al. at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011, and on observations by R. Fricke on 7–10 Nov. 2011, St. B31, B32, B33, B49, B50; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7, B14. – Remarks: This species is similar to *Chlorurus microrhinos* (Bleeker, 1854) of the western Pacific Ocean.

Scarus forsteni (Bleeker, 1861) – Forsten's parrotfish; Perroquet mauve. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Scarus frenatus Lacepède [ex Commerson], 1802 – Bridled parrotfish, vermiculate parrotfish. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 7–11 Nov. 2011, St. B31, B34, B37, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B8, B12, EU7.

Scarus ghobban Forsskål in Niebuhr, 1775 – Blue-barred parrotfish; Perroquet bleu (Réunion), perroquet à écailles jaunes (France). – Distribution: First record from Europa Island as *Callyodon guttatus* by Fourmanoir (1952: 172); record confirmed by R. Fricke on an observation on 8–11 Nov. 2011, St. B49, EU5; also observed by P. Durville, 12 Nov. 2011, St. EU5.

Scarus niger Forsskål in Niebuhr, 1775 – Perroquet dorade. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Scarus rubroviolaceus Bleeker, 1847 – Ember parrotfish; Perroquet braisé. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU3, EU4, EU5, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Scarus scaber Valenciennes in Cuvier & Valenciennes, 1840 – Dusky-capped parrotfish; Perroquet marron (Réunion), perroquet à cinq celles (France). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B12, B14, EU3.

Scarus tricolor Bleeker, 1847 – Tricolour parrotfish; Perroquet tricolore. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, EU2, EU3, EU7.

Pinguipedidae

Parapercis hexophtalma (Cuvier [ex Ehrenberg] in Cuvier & Valenciennes, 1829) – Speckled sandperch, spotted sandsmelt; Pinge pintade. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 10–11 Nov. 2011, St. B14, EU2.

Parapercis punctulata (Cuvier in Cuvier & Valenciennes, 1829) – Spotted sandperch, spotted sandsmelt. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Tripterygiidae

Enneapterygius abeli (Klausewitz, 1960) – Yellow triplefin. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34782 (3), SMF 34824 (1).

Enneapterygius philippinus (Peters, 1868) – Minute triplefin. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke, 11–12 Nov. 2011, St. B28, and by P. Durville, 12 Nov. 2011, St. B25; previously reported as *Enneapterygius* sp. by Fourmanoir (1952: 188). – Material: SMF 34825 (25), SMF 34836 (8).

Enneapterygius ventermaculus Holleman, 1982 – Blotched triplefin. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 9–12 Nov. 2011, St. B28; also observed by P. Durville, 11 Nov. 2011, St. B5. – Material: SMF 34736 (1), SMF 34783 (4), SMF 34826 (4).

Blenniidae

Antennablennius australis Fraser-Brunner, 1951 – Moustached rockskipper. – Distribution: **New record** from Europa Island, based on specimens collected by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34828 (2).

Antennablennius bifilum (Günther, 1861) – Horned rockskipper. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11 Nov. 2011, St. B28. – Material: SMF 34746 (2).

Aspidontus tractus Fowler, 1903 – Mimic blenny. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 11 Nov. 2011, St. EU5.

Blenniella chrysospilos (Bleeker, 1857) – Red-spotted blenny; Blennie à taches rouges. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28, and by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34747 (2), SMF 34789 (16), SMF 34829 (2).

Blenniella gibbifrons (Quoy & Gaimard, 1824) – Hump-headed blenny. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28, and by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34748 (3), SMF 34790 (1), SMF 34830 (2).

Blenniella periophthalmus (Valenciennes in Cuvier & Valenciennes, 1836) – Blue-dashed rockskipper, bullethead rockskipper. – Distribution: First record from Europa Island as *Alticops periophtalmus* by Fourmanoir (1952: 169); record confirmed by R. Fricke based on a specimen collected on 9–12 Nov. 2011, St. B28, EU5. – Material: SMF 34728 (1), SMF 34749 (4), SMF 34791 (4).

Cirripectes auritus Carlson, 1981 – Blackflap blenny. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Cirripectes castaneus (Valenciennes in Cuvier & Valenciennes, 1836) – Muzzled rockskipper, chestnut blenny. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Cirripectes filamentosus (Alleyne & Macleay, 1877) – Filamentous blenny. – Distribution: **New record** from Europa Island, based on an observation and a specimen collected by R. Fricke on 8–9 Nov. 2011, St. B28, B34; also on a specimen collected by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Ecsenius lineatus Klausewitz, 1962 – Linear blenny; Blennie bigula. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 8 Nov. 2011, St. B49; also observed at Europa Island by P. Durville et al. as *Ecsenius* sp. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, EU2, EU3, EU7, photographed at St. EU6, and collected on 11 Nov. 2011, on the north side of the island, 18 m depth.

Ecsenius sp. (black, head light). – Distribution: Recorded from Europa Island, based on an observation by P. Durville, 10–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU5.

Exallias brevis (Kner, 1868) – Shortbodied blenny, leopard blenny, leopard rockskipper. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU4.

Istiblennius edentulus (Schneider [ex Forster] in Bloch & Schneider, 1801) – Rippled rockskipper. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 7–12 Nov. 2011, St. B28, B31, B34, B37, EU5, and by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34792 (1), SMF 34831 (1).

Istiblennius steindachneri (Pfeffer, 1893) – Steindachner's rockskipper. – Distribution: **New record** from Europa Island; previously listed as *Alticops oryx* (non Rüppell, 1830) by Fourmanoir (1952: 169).

Plagiotremus rhinorhynchos (Bleeker, 1852) – Twostripe blenny. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and by R. Fricke on 8 Nov. 2011, St. B34, B49; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B12, B14, EU3, EU4.

Plagiotremus tapeinosoma (Bleeker, 1857) – Piano blenny. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B8, B12, B14, EU3, EU7.

Salarias fasciatus (Bloch, 1786) – Jewelled blenny. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 11 Nov. 2011, St. EU5.

Callionymidae

Diplogrammus infulatus Smith, 1963 – Sawspine dragonet. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34750 (2), SMF 34793 (1).

Eleotridae

Ophiocara porocephala (Valenciennes in Cuvier & Valenciennes, 1837) – Flathead sleeper; Cabot marare (Réunion), éléotris à tête poreuse (France). – Distribution: **New record** from Europa Island; previously listed as *Ophiocara* sp. by Fourmanoir (1952: 187).

Gobiidae

Amblygobius semicinctus (Bennett, 1833) – Half-barred goby; Gobie galonne (Fig. 18). – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 10 Nov. 2011, St. B37, and on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Amblygobius sphynx (Valenciennes in Cuvier & Valenciennes, 1837) – Sphinx goby. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 7 Nov. 2011, St. B32.

Bathygobius cotticeps (Steindachner, 1880) – Cheekscaled frillgoby. – Distribution: **New record** from Europa Island, based on a specimen collected by R. Fricke on 10–12 Nov. 2011, St. B28, B50. – Material: SMF 34737 (1), SMF 34753 (3), SMF 34796 (2).

Bathygobius fuscus (Rüppell, 1830) – Dusky frillgoby. – Distribution: First record from Europa Island by Fourmanoir (1952: 169); record confirmed by R. Fricke based on specimens collected and observed at Europa on 7–12 Nov. 2011, St. B28, B31, B34, B37, EU5, and collected by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34797 (12), SMF 34832 (5).

Cryptocentrus cryptocentrus (Valenciennes in Cuvier & Valenciennes, 1837) – Ninebar prawn goby. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011 among the mangroves in the inner lagoon of Europa Island.

Ctenogobiops maculosus (Fourmanoir, 1955) – Seychelles shrimpgoby. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 8 Nov. 2011, St. B34.

Eviota indica Lachner & Karnella, 1980 – Indian Ocean coral goby. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 11 Nov. 2011, on the north side of the island, 18 m depth.

Eviota prasina (Klunzinger, 1871) – Green bubble goby. – Distribution: **New record** from Europa Island, based on specimens collected and observed by R. Fricke on 8–12 Nov. 2011, St. B28, B34, B50, EU5, and collected by P. Durville & P. Chabanet on 12 Nov. 2011, St. B25. – Material: SMF 34729 (2), SMF 34738 (3), SMF 34755 (9), SMF 34798 (21), SMF 34833 (1).

Eviota sp. 1. – Distribution: Observed at Europa Island, based on specimens collected by P. Durville & P. Chabanet on 8–11 Nov. 2011, St. EU6, and on the north side of the island, 18 m depth, and a specimen collected by R. Fricke on 11 Nov. 2011, St. B28. – Material: SMF 34754 (1).

Eviota sp. 2. – Distribution: Observed at Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 11 Nov. 2011, on the north side of the island, 18 m depth.

Fusigobius inframaculatus (Randall, 1994) – Flag fusegoby. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7, observed by P. Durville & P. Chabanet on 10 Nov. 2011, St. EU2, and a photograph taken by P. Durville at St. EU6.

Gnatholepis anjerensis (Bleeker, 1851) – Eye-bar goby. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 11 Nov. 2011, on the north side of the island, 18 m depth, and on a photograph taken by P. Durville at St. EU6.

Gnatholepis cauerensis (Bleeker, 1853) – Dark eye-bar goby. – Distribution: **New record** from Europa Island, based on observation by P. Durville et al. during the expedition MD-11, and on specimens collected by R. Fricke at Europa on 7–11 Nov. 2011, St. B31, B33, B34, B37, B49, B50, EU5, and by P. Durville & P. Chabanet on 7–10 Nov. 2011, St. EU2, EU7. – Material: SMF 34739 (1).

Gobiodon citrinus (Rüppell, 1838) – Lemon coral goby. – Distribution: First record from Europa Island by Fourmanoir (1952: 187).

Koumansetta hectori (Smith, 1957) – Hector's goby. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Lotilia graciliosa Klausewitz, 1960 – Whitecap goby. – Distribution: **New record** from Europa Island, based on an observation by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Pleurosicya micheli Fourmanoir, 1971 – Michel's ghost goby. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Priolepis cincta (Regan, 1908) – Girdled goby. – Distribution: **New record** from Europa Island, based on specimens collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34756 (4), SMF 34799 (6).

Priolepis inhaca (Smith, 1949) – Brick goby. – Distribution: **New record** from Europa Island, based on a specimen collected by R. Fricke on 11–12 Nov. 2011, St. B28. – Material: SMF 34757 (1), SMF 34800 (1).

Silhouettea insinuans Smith, 1959 – Phantom goby. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Trimma anaima Winterbottom, 2000 – Comores goby. – Distribution: **New record** from Europa Island, based on specimens collected by P. Durville & P. Chabanet on 7–8 Nov. 2011, St. EU6, EU7.

Trimma sp. [aff. *Trimma okinawae* (Aoyagi, 1949)]. – Distribution: Observed at Europa Island, based on a photograph taken by P. Durville on 12 Nov. 2011, St. EU5.

Valenciennea strigata (Broussonet [ex Forster], 1782) – Blueband goby. – Distribution: **New record** from Europa Island, based on observations by R. Fricke on 8–11 Nov. 2011, St. B34, B37, EU5; also observed by P. Durville, 12 Nov. 2011, St. EU5.

Vanderhorstia ambanoro (Fourmanoir, 1957) – Ambanoro prawn goby. – Distribution: **New record** from Europa Island, based on observations by R. Fricke on 8–10 Nov. 2011, St. B34, B37.

Microdesmidae

Nemateleotris magnifica Fowler, 1938 – Fire goby, fire dartfish; Poisson de feu. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also on observations by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B12, B14, EU2, EU3, EU7.

Ptereleotris evides (Jordan & Hubbs, 1925) – Blackfin dartfish, scissortail; Flèche noire. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. EU2, EU3.

Ptereleotris microlepis (Bleeker, 1856) – Blue gudgeon. – Distribution: **New record** from Europa Island, based on observations and specimens collected by R. Fricke on 8–11 Nov. 2011, St. B28, B34. – Material: SMF 34731 (1), SMF 34765 (1).

Ptereleotris zebra (Fowler, 1938) – Zebra dartfish; Gobie zèbre. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU4.

Siganidae

Siganus laqueus Bonde, 1934 – Star-spotted rabbitfish, brown-spotted spinefoot; Sigan marguerite. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Zanclidae

Zanclus cornutus (Linnaeus, 1758) – Moorish idol; Cocher blanc. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, EU2, EU3, EU7, and by R. Fricke on 10–11 Nov. 2011, St. B50, EU5.

Acanthuridae

Acanthurus bariene Lesson, 1831 – Black-spot surgeonfish. – Distribution: First record from Europa Island as *Acanthurus basiene* by Fourmanoir (1952: 184), and as *Acanthurus bariene* by Fourmanoir (1952: 186); record confirmed by R. Fricke based on an observation at Europa on 7 Nov. 2011, St. B31, 33.

Acanthurus blochii Valenciennes in Cuvier & Valenciennes, 1835 – Tailring surgeonfish; Chirurgien à queue rayée. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Acanthurus dussumieri Valenciennes in Cuvier & Valenciennes, 1835 – Eyestripe surgeonfish; Chirurgien de Dussumier. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, B8, EU7.

Acanthurus leucosternon Bennett, 1833 – Powder-blue surgeonfish; Chirurgien poudré. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B8, B12, EU3.

Acanthurus lineatus (Linnaeus, 1758) – Lined surgeonfish; Chirurgien à lignes bleues. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. at St. 1 (equals St. EU5 of this paper) during an expedition with R/V Marion Dufresne on 5 April 2011; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, EU5, EU7, and by R. Fricke on 9–11 Nov. 2011, St. B28, EU5.

Acanthurus nigricauda Duncker & Mohr, 1929 – Epaulette surgeonfish; Chirurgien à queue blanche. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B14, EU2, EU3, EU5.

Acanthurus nigrofuscus (Forsskål in Niebuhr, 1775) – Dusky surgeonfish; Chirurgien brun. – Distribution: First record from Europa Island as *Acanthurus lineolatus* by Fourmanoir (1952: 184); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B8, B12, EU2, EU3, EU4.

Acanthurus tennentii Günther, 1861 – Lieutenant surgeonfish, doubleband surgeonfish; Chirurgien fer à cheval. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Acanthurus thompsoni (Fowler, 1923) – Thompson's surgeonfish; Chirurgien chocolat. – Distribution: **New record** from Europa Island, based on an observation by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, EU7.

Acanthurus triostegus (Linnaeus, 1758) – Convict surgeonfish; Cordonnier (Réunion). – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed by P. Durville et al. based on a observation at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011, an observation by P. Borsa in the mangrove area on 7 April 2011, and by R. Fricke based on observations and specimens collected at Europa on 7–12 Nov. 2011, St. B28, B31, B32, B33, B34, B37, B49, B50, EU5; also observed by P. Durville, 12 Nov. 2011, St. B25. – Material: SMF 34726 (2), SMF 34742 (1), SMF 34785 (1).

Acanthurus xanthopterus Valenciennes in Cuvier & Valenciennes, 1835 – Yellowfin surgeonfish; Chirurgien (Réunion), chirurgien aile jaune (France). – Distribution: First record from Europa Island as *Acanthurus fuliginosus* by Fourmanoir (1952: 184); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B8, B12, EU3.

Ctenochaetus striatus (Quoy & Gaimard, 1825) – Striated surgeonfish; Chirurgien strié. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B12, EU3, EU5, and by R. Fricke on 11 Nov. 2011, St. EU5.

Ctenochaetus truncatus Randall & Clements, 2001 – Goldring bridletooth. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and by R. Fricke based on an observation at Europa on 7–11 Nov. 2011, St. B31, B34, B49, B50, EU5; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU7.

Naso brachycentron (Valenciennes in Cuvier & Valenciennes, 1835) – Humpback unicornfish; Nason bossu. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10 Nov. 2011, St. B8.

Naso brevirostris (Cuvier, 1829) – Spotted unicornfish, palefin unicornfish; Nason à rostre court. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10–11 Nov. 2011, St. B5, B8, B14.

Naso elegans (Rüppell, 1829) – Indian Ocean orangespine unicornfish, elegant unicornfish; Nason bariolé (Fig. 13). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, B8, B14, EU2, EU3, EU4, EU7, and by R. Fricke on 10 Nov. 2011, St. B50.

Naso hexacanthus (Bleeker, 1855) – Sleek unicornfish; Nason lisse. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Naso tuberosus Lacepède [ex Commerson], 1801 – Humpnose unicornfish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville, 10 Nov. 2011, St. B8.

Naso unicornis (Forsskål in Niebuhr, 1775) – Bluespine unicornfish; Licorne (Réunion), nason à épérons bleus (France). – Distribution: **New record** from Europa Island, based on observations by P. Durville et al. at St. 1 and St. 2 (equals St. EU5 and B34 of this paper) during an expedition with R/V Marion Dufresne on 5–6 April 2011; also observed by P. Durville & P. Chabanet on 7–11 Nov. 2011, St. B5, B8, B14, EU2, EU5, EU7, and by R. Fricke on 10–11 Nov. 2011, St. B37, EU5; record also confirmed based on photograph by E. Bretagne, taken in November 2011.

Naso vlamingi (Valenciennes in Cuvier & Valenciennes, 1835) – Bignose unicornfish; Nason zébré. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 9 Nov. 2011, St. B28.

Paracanthurus hepatus (Linné, 1766) – Palette surgeonfish; Chirugien bleu. – Distribution: **New record** from Europa Island, based on a photograph by P. Durville taken on 11 Nov. 2011, on the north side of the island below the boat mooring, at 18 m depth.

Zebrasoma gemmatum (Valenciennes in Cuvier & Valenciennes, 1835) – Gem surgeonfish; Acanthure à pierreries. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Zebrasoma scopas (Cuvier, 1829) – Brushtail tang, twotone tang; Chirurgien à brosses. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU7.

Zebrasoma velifer (Bloch, 1795) – Desjardin's sailfin tang; Chirurgien à voile. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. dur-

ing the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B5, B8, B14, EU3.

Sphyraenidae

Sphyraena barracuda (Catesby [ex Edwards], 1771) – Great barracuda; Barracuda (Réunion) (Fig. 19). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11, and an observation by P. Borsa in the mangrove area on 7 April 2011; previously listed as *Sphyraena* sp. by Fourmanoir (1952: 170); also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, EU3, EU7; record confirmed based on photograph by E. Bretagne, taken in November 2011.

Scombridae

Euthynnus affinis (Cantor, 1850) – Eastern little tuna; Bonite la côte (Réunion), thonine orientale (France). – Distribution: **New record** from Europa Island; previously listed as *Euthynnus alleteratus* (non Rafinesque-Schmaltz, 1810) by Fourmanoir (1952: 179).

Thunnus albacares (Bonnaterre, 1788) – Yellowfin tuna; Thon jaune (Réunion). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Bothidae

Bothus mancus (Broussonet, 1782) – Peacock flounder; Sole (Réunion). – Distribution: First record from Europa Island by Fourmanoir (1952: 184).

Balistidae

Balistapus undulatus (Park, 1797) – Orange-striped triggerfish; Baliste ondulé. – Distribution: First record from Europa Island by Fourmanoir (1952: 181); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3, EU4, EU7, and by R. Fricke on 11 Nov. 2011, St. EU5.

Balistoides conspicillum (Bloch & Schneider, 1801) – Clown triggerfish; Bourse piastre, bourse pièce (Réunion), baliste léopard, baliste clown (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 188); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B12, B14, EU3.

Balistoides viridescens (Bloch & Schneider, 1801) – Titan triggerfish; Bourse jaune (Réunion), baliste verdâtre (France). – Distribution: First record from Europa Island by Fourmanoir (1952: 188); record confirmed by P. Durville et al. during the expedition MD-11, and by R. Fricke on 9–10 Nov. 2011, St. B28, B37; also observed by P. Durville & P. Chabanet on 9–12 Nov. 2011, St. B5, B8, B12, B14, EU2, EU3.

Melichthys niger (Bloch, 1786) – Black triggerfish; Baliste noir. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B5, B8, B14, EU2, EU3, EU4.

Odonus niger (Rüppell, 1836) – Redtooth triggerfish; Bourse noire (Réunion). – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Pseudobalistes flavimarginatus (Rüppell, 1829) – Yellowface triggerfish; Baliste face jaune. – Distribution: First record from Europa Island as *Pseudobalistes flavomarginatus* by Fourmanoir (1952: 188); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 10 Nov. 2011, St. EU2.

Rhinecanthus aculeatus (Linnaeus, 1758) – Picassofish; Bourse revolver (Réunion). – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed by R. Fricke based on observations and specimens collected at Europa on 7–12 Nov. 2011, St. B28, B31, B32, B34, B37, B49, B50, EU5.

Rhinecanthus rectangulus (Lacepède [ex Commerson] in Bloch & Schneider, 1801) – Wedge picassofish; Bourse (Réunion), picasso noir (France). – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 9–11 Nov. 2011, St. B28, EU5; also observed by P. Durville, 10–12 Nov. 2011, St. B25, EU2.

Sufflamen bursa (Lacepède [ex Commerson] in Bloch & Schneider, 1801) – Boomerang triggerfish; Baliste boomerang. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7–12 Nov. 2011, St. B12, B14, EU2, EU7.

Sufflamen chrysopterum (Bloch & Schneider, 1801) – Halfmoon triggerfish; Baliste double-queue. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 9–10 Nov. 2011, St. B8, EU3, EU4.

Monacanthidae

Cantherhines dumerilii (Hollard, 1854) – Barred filefish; Bourse à taches blanches. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 11 Nov. 2011, St. B5, B14.

Cantherhines pardalis (Rüppell, 1837) – Honeycomb filefish; Bourse rayon de miel. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9–11 Nov. 2011, St. B14, EU2, EU3.

Pervagor janthinosoma (Bleeker, 1854) – Blackbar filefish. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11.

Ostraciidae

Ostracion meleagris Shaw in Shaw & Nodder, 1796 – Whitespotted boxfish; Coffre pintade. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7, and on 12 Nov. 2011 at St. EU5.

Tetraodontidae

Arothron meleagris (Anonymus [ex Lacepède, ex Commerson], 1798) – Guineafowl puffer; Compère pintade. – Distribution: **New record** from Europa Island, based on observation by P. Durville & P. Chabanet on 9 Nov. 2011, St. EU3.

Arothron nigropunctatus (Bloch & Schneider, 1801) – Black-spotted puffer; Compère à taches noires. – Distribution: First record from Europa Island by Fourmanoir (1952: 172); record confirmed by P. Durville et al. during the expedition MD-11.

Arothron stellatus (Anonymus [ex Lacepède, ex Commerson], 1798) – Star puffer; Compère étoilé. – Distribution: First record from Europa Island by Fourmanoir (1952: 172, pl. 13A); record confirmed by P. Durville et al. during the expedition MD-11.

Canthigaster amboinensis (Bleeker, 1865) – Spotted toby. – Distribution: First record from Europa Island as *Canthigaster margaritatus* (non Rüppell, 1829) by Fourmanoir (1952: 188).

Canthigaster bennetti (Bleeker, 1854) – Exquisite toby; Canthigaster delicat. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 10 Nov. 2011, St. B50.

Canthigaster janthinoptera (Bleeker, 1855) – Honeycomb toby. – Distribution: **New record** from Europa Island, based on an observation by P. Durville et al. during the expedition MD-11; also observed by P. Durville, 12 Nov. 2011, St. B12.

Canthigaster natalensis (Günther, 1870) – Natal toby. – Distribution: **New record** from Europa Island, based on an observation by R. Fricke on 7–8 Nov. 2011, St. B32, B49.

Canthigaster solandri (Richardson [ex Solander], 1845) – Spotted sharpnose pufferfish; Canthigaster de Solander. – Distribution: **New record** from Europa Island, based on a specimen collected by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7.

Canthigaster valentini (Bleeker, 1853) – Black-saddled toby; Canthigaster à selle. – Distribution: First record from Europa Island as *Canthigaster Valentini* by Fourmanoir (1952: 188); record confirmed by P. Durville et al. during the expedition MD-11; also observed by P. Durville & P. Chabanet on 7 Nov. 2011, St. EU7, and by R. Fricke on 8 Nov. 2011, St. B49.

4 Fish fauna of Europa Island

The shore fish fauna of Europa Island comprises a total of 389 species in 62 families. 302 species are recorded from Europa Island for the first time. No introduced species have been found. The largest families are the Labridae (47 native species, 12.1 % of the native species), Pomacentridae (35 species, 9.0 %), Serranidae (30 species, 7.7 %), Gobiidae and Acanthuridae (24 species each, 6.2 %), Chaetodontidae (20 species, 5.1 %), Blenniidae (17 spe-

Tab. 2. Proportion (percent of total) and rank (in parentheses) of the most speciose families of shore fishes around islands in the southwestern Indian Ocean, based on the sources cited under Methods and Materials. Only "shore" fish species are included, i. e. marine species which live in less than 80 m depth and are not found as adults in the oceanic pelagic waters.

	Europa Island	Seychelles	Maldives	Chagos Archipelago	Réunion	Mauritius	Rodrigues
Labridae	12.1 (1)	7.8 (2)	7.2 (2)	8.1 (2)	7.7 (1)	9.8 (1)	7.9 (2)
Pomacentridae	9.0 (2)	4.8 (3)	4.9 (4)	4.9 (5)	5.5 (4)	4.3 (5)	6.7 (3)
Serranidae	7.8 (3)	4.4 (4)	6.4 (3)	6.4 (3)	6.2 (3)	6.7 (2)	5.5 (4)
Gobiidae	6.2 (4)	9.1 (1)	8.2 (1)	12.6 (1)	6.5 (2)	5.7 (3)	12.8 (1)
Acanthuridae	6.2 (4)	3.6 (6)	2.5 (11)	3.9 (7)	3.4 (8)	3.1 (8)	3.5 (8)
Chaetodontidae	5.1 (6)	2.2 (12)	3.2 (8)	3.2 (8)	2.8 (9)	2.9 (9)	3.7 (7)
Blenniidae	4.4 (7)	3.5 (7)	3.4 (7)	3.2 (8)	4.2 (5)	4.5 (4)	3.9 (6)
Lutjanidae	3.9 (8)	2.5 (10)	2.8 (10)	2.6 (11)	2.7 (10)	2.7 (10)	2.8 (9)
Carangidae	2.8 (9)	3.1 (8)	2.0 (14)	1.9 (14)	4.0 (6)	2.9 (9)	2.2 (11)
Balistidae	2.6 (10)	1.5 (15)	1.7 (15)	2.1 (13)	2.2 (12)	1.9 (14)	1.8 (13)
Scaridae	2.6 (10)	2.1 (13)	2.3 (12)	2.8 (10)	1.8 (15)	2.6 (11)	3.5 (8)
Holocentridae	2.3 (12)	2.4 (11)	2.2 (13)	2.8 (10)	2.8 (9)	2.1 (13)	2.0 (12)
Muraenidae	2.3 (12)	2.9 (9)	4.0 (5)	5.4 (4)	3.8 (7)	3.9 (6)	2.6 (10)
Pomacanthidae	2.1 (14)	1.1 (17)	1.3 (17)	0.8 (22)	1.2 (20)	1.2 (18)	0.6 (19)
Tetraodontidae	2.1 (14)	2.4 (11)	2.0 (14)	1.2 (17)	2.6 (11)	2.1 (13)	1.0 (17)
Apogonidae	1.8 (16)	4.1 (5)	3.8 (6)	4.2 (6)	2.2 (12)	2.7 (10)	4.1 (5)
Caesionidae	1.8 (16)	1.1 (17)	1.3 (17)	1.2 (17)	0.9 (25)	0.7 (23)	0.2 (21)
Mullidae	1.8 (16)	2.5 (10)	1.0 (19)	1.4 (16)	2.0 (13)	1.5 (16)	2.6 (10)
Total number of species	389	905	1013	780	818	940	493

cies, 4.4 %), Lutjanidae (15 species, 3.9 %), Carangidae (11 species, 2.8 %), Balistidae and Scaridae (10 species each, 2.6 %). It is surprising that relatively few Gobiidae have been found, and this is not just based on the focus on visual census, but supported by collecting efforts.

The fish fauna is exclusively marine; no freshwater fishes have been reported from the island, and there is no permanent fresh water habitat on the island. The general impression is that the fish fauna is impoverished, with relatively few species occurring, some of them having a very high biomass. Europa Island is an extremely poor-nutrient area, with relatively few plankton in the water. Even the mangrove area has a clean sand bottom, without any mud or silt. Though the distance to the African continental shelf is only 262 km towards the west, and 153 km to the Madagascar island shelf in the east, many species of the continental type which are adapted to nutrient-rich waters are not found in Europa Island.

It is difficult to compare the faunas of islands and island groups in the Western Indian Ocean as the sampling effort is highly variable from one island to the next. Restricting the comparison to the coastal species (marine species, found in less than 80 m, excluding oceanic pelagic species) there is a similarity in the ranking of the various families (Tab. 2). The families with the highest species richness usually include the Labridae, Pomacentridae, Seranidae and Gobiidae, with different ranks. While at Europa Island the Labridae was the most speciose family, in other islands the Gobiidae are the dominant group. The situation at Europa Island is apparently not affected by sampling effort, as even in shallow lagoon habitats a very poor diversity of gobies is observed relative to other regions. Several other fish families appear to be under-represented at Europa Island; the family Scorpaenidae, for instance, which is usually among the top 15 in other island groups, is not included in the top 18 list of Europa Island.

No endemism of fish species has been reported for Europa Island. This fact reflects the proximity of the island to Bassas da India Atoll, another of the Îles Éparses, to the continental shelf of Mozambique and the island shelf of Madagascar.

The fish fauna of Europa island is typical for offshore, low islands in the southwestern Indian Ocean. Zoogeographically, the main element of the fish fauna of Europa Island consists of widespread tropical Indo-Pacific species (292 species, 75.1 % of the total occurring species), of which 273 species (70.2 %) have a typical Indo-West Pacific distribution, and 19 species (4.9 %) an Indo-Pacific distribution including the East Pacific. A total of 13 species (3.3 %) are found worldwide, either circumtropical or circumtropical including warm temperate zones. An additional 76 species (19.5 %) are Indian Ocean endemics, including 36 western Indian Ocean endemics (9.2 %), and 10 southwestern Indian Ocean endemics (2.6 %). These figures are similar to the zoogeographical relationships of the fish fauna of Réunion (see Fricke et al. 2009).

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Callionymus profundus n. sp., a new species of dragonet from the Gulf of Aqaba (Gulf of Eilat), Red Sea (Teleostei: Callionymidae)

Ronald Fricke & Daniel Golani

Abstract

A new species of deep-living dragonet, *Callionymus profundus*, from the northern Red Sea, is described on the basis of a single male specimen. The new species is compared with similar species. Revised keys to callionymid fish species of the western Indian Ocean and the Red Sea, as well as species of the subgenus *Callionymus (Bathycallionymus)*, are presented. Another species of the subgenus, *Callionymus carebares* Alcock, 1890, is recorded for the first time from the Andaman Sea, Thailand.

Keywords: Fishes, dragonets, Callionymidae, new species, new record, Red Sea, Andaman Sea, Israel, Thailand, identification key.

Zusammenfassung

Eine neue Art in tiefem Wasser lebender Leierfische, *Callionymus profundus*, wird aus dem nördlichen Roten Meer beschrieben. Die neue Art wird mit ähnlichen Arten verglichen. Diese Arbeit enthält revidierte Bestimmungsschlüssel der Callionymidae des westlichen Indischen Ozeans und Roten Meeres, sowie der Arten der Untergattung *Callionymus (Bathycallionymus)*. Eine weitere Art der Untergattung, *Callionymus carebares* Alcock, 1890, wird erstmals aus der Andamanensee (Thailand) nachgewiesen.

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1 Introduction

Dragonets of the family Callionymidae are a group of benthic living fishes occurring in the upper 900 metres of all temperate, subtropical and tropical oceans of the world, and a few species are found in estuarine and freshwater habitats. The Indo-Pacific species were revised by Fricke (1983a), who distinguished 126 valid species from the area, including three species from the Mascarenes. Fricke (2002), in a checklist of the callionymid fishes of the world, listed a total of 182 valid species in 10 genera. Subsequently, five additional species (*Callionymus kanakorum* and *Protogrammus antipodum* from New Caledonia, *Tonlesapia tsukawakii* and *T. amnica* from Cambodia and Vietnam, respectively, and *Synchiropus tudorjonesi* from Papua, Indonesia) were described by Fricke (2006), Motomura & Mukai (2006), Ng & Rainboth (2011), and Allen & Erdmann (2012), respectively, and *Eleutherochir mccaddeni* Fowler, 1941 was removed from the synonymy of *E. opercularis* by Yoshigou et al. (2006), bringing the worldwide total to 188 species in the family.

Fricke (1981: 350) defined the *kaianus* species-group of the genus *Callionymus* as having a combination of large eyes, 4 flexible spines in the first dorsal fin, 9 rays each in the second dorsal and anal fins, one or two median unbranched caudal-fin rays which are often filamentous, a characteristic shape of the preopercular spine with a small antrorse barb in addition to 1–3 larger curved points on the dorsal margin, and (usually) a characteristic black blotch on the third membrane of the first dorsal fin. He distinguished 13 species in the group, most of which are endemic in small distribution ranges within the Indo-West Pacific. Nakabo (1982: 86) described the genus *Bathycallionymus* with *Callionymus kaianus* Günther, 1880 as the type species. Fricke (2002: 99) treated *Bathycallionymus* (the former *kaianus* species-group) as a subgenus of the genus *Callionymus*, and distinguished 18 species. Fricke (2006) described *Callionymus kanakorum*, another member of the subgenus, from New Caledonia. Fricke et al. (2011) recorded *Callionymus kanakorum* from Espiritu Santo, Vanuatu.

A single specimen of an undescribed species of the subgenus, which was previously misidentified as *Callionymus*

bentuviai, was trawled in deep water of the northern Gulf of Aqaba (Gulf of Eilat), Israel, Red Sea. This obviously very rare species is described herein, and brings the total number of species known in the subgenus to 19.

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2 Methods and Materials

Methods follow Fricke (1983a); fin-ray counts follow Fricke (1983b). The starting point for length measurements is the mid of the upper lip. The standard length (measured from the tip of the upper lip to the middle of the urohyal/caudal-fin base) is abbreviated SL, the lateral line is abbreviated LL, the dorsal fin D, the anal fin A. The predorsal (1) length is measured from the mid of the upper lip to the base of the first spine of the first dorsal fin; the predorsal (2) length correspondingly to the base of the first ray of the second dorsal fin. The last ray of the second dorsal and anal fins is always divided at its base; counts in the key include this divided ray as one. For the pectoral fins, 2 values for the fin-ray number are provided, as the numbers of the left and the right fin are counted. Species are classified based on Fricke (2002). Nomenclature follows Eschmeyer (2012). References and journals follow Fricke (2012) and Fricke & Eschmeyer (2012a); abbreviations of museum collections (see below) follow Fricke & Eschmeyer (2012b).

Abbreviations of museum collections

AMS The Australian Museum, Sydney, Australia
BMNH The Natural History Museum, London, UK [formerly British Museum (Natural History)]
CAS California Academy of Science, San Francisco, USA
CSIRO CSIRO Marine & Atmospheric Research, Hobart, Australia
FAKU The Kyoto University Museum, Kyoto, Japan [formerly Department of Fisheries, Faculty of Agriculture, Kyoto University, Kyoto, Japan]
FMNH Field Museum of Natural history, Chicago, USA
HUJ Hebrew University, Fish Collection, Jerusalem, Israel
HUMZ The Hokkaido University Museum, Sapporo, Japan [formerly Museum of Zoology, Hokkaido University, Hakodate, Japan]
IRSN Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium
MNHN Muséum National d'Histoire Naturelle, Paris, France
MSL Marine Science Laboratory, Chinese University of Hong Kong, China
NSMT National Museum of Nature and Science, Tsukuba, Tokyo, Japan [formerly National Science Museum]
NTM Northern Territory Museum of Arts and Science, Darwin, Australia
QM Queensland Museum, Brisbane, Australia
RMNH Naturalis, Nederlands Centrum voor Biodiversiteit, Leiden, Netherlands [formerly Rijksmuseum van Natuurlijke Historie]
SMNS Staatliches Museum für Naturkunde Stuttgart, Germany
USNM National Museum of Natural History, Smithsonian Institution, Museum Support Center, Suitland, MD, USA
WAM Western Australian Museum, Perth, Australia
ZIM Zoologisches Institut und Zoologisches Museum, Universität Hamburg, Germany
ZMUC Zoologisk Museum, University of Copenhagen, Denmark
ZSI Zoological Survey of India, Kolkata, India

Comparative material

Callionymus africanus (Kotthaus, 1977): ZIM 5533 (holotype), seamount NE of Mombasa, Kenya; BMNH 1939.5.24.1422 (1), near Zanzibar, Tanzania; RMNH 19984 (6), seamount on Chain Ridge, off Somalia; ZIM 5534 (30 paratypes), seamount NE of Mombasa, Kenya.

Callionymus altipinnis Fricke, 1981 (all China): MSL 0001 (holotype), Hong Kong; CAS 46967 (10 paratypes), Hainan; CAS 46968 (1 paratype), Hainan; CAS 46969 (1 paratype), Hainan.

Callionymus bentuviai Fricke, 1981 (all Eritrea, southern Red Sea): HUJ 9935 (holotype); HUJ 6674 (2); HUJ 6675 (1); HUJ 8068 (2 paratypes); HUJ 10463 (2); ZIM 5532 (2 paratypes).

Callionymus bifilum Fricke, 2000: CSIRO CA.3532 (holotype), Joseph Bonaparte Gulf, Western Australia; BMNH 1892.1.14.26–27 (2 paratypes), Holothuria Bank, Western Australia.

Callionymus bleekeri Fricke, 1983: RMNH 4872 (holotype), Java, Indonesia.

Callionymus carebares Alcock, 1890: BMNH 1890.11.28.18–24 (7 syntypes), Ganjam, India; MNHN 1890-0335–0340 (6 syntypes), Ganjam, India; ZSI F.12740–F.12741 (2 syntypes), Ganjam, India; ZSI F.12742 and F.12858 (15 syntypes), Ganjam, India; AMS I.28730-001 (1), Maputo, Mozambique; BMNH 1903.5.14.34 (1), Karachi, Pakistan; BMNH 1904.5.25.218–220 (3), Sea of Oman, Oman; BMNH 1939.5.24.1384 (1), Gulf of Oman, Oman; BMNH 1939.5.24.1385–1409 (24), Arabian Sea; BMNH 1939.5.24.1410–1421 (15), Gulf of Aden, Yemen; FMNH 5740 (1), Sea of Oman, Oman; IRSN 1797 (2), Bay of Bengal, India; SMNS 23508 (1), Thailand, Andaman Sea (**new record**).

Callionymus formosanus Fricke, 1981: CAS 46972 (holotype), Pescadores Strait, Taiwan.

Callionymus futuna Fricke, 1998 (all Wallis and Futuna, Futuna Island shelf): MNHN 1995-0521 (holotype); MNHN 1995-0522 (2 paratypes); SMNS 18823 (1 paratype).

Callionymus guentheri Fricke, 1981 (all Philippines): BMNH 1879.5.14.567 (holotype), Zamboanga; CAS 32668 (2 paratypes), Batangas, Luzon; CAS 32801 (1 paratype), Marinduque; CAS 32897 (11 paratypes), Batangas, Luzon; CAS 32905 (7 paratypes), Camarines Sur; CAS 32916 (5 paratypes), Quezon, Luzon; CAS 32997 (1 paratype), Balayan Bay; CAS 33067 (1 paratype), Luzon; CAS 33703 (1 paratype), Balayan Bay; CAS 33864 (3 paratypes), Camarines Sur; CAS 33879 (1 paratype), Marinduque; CAS 34074 (1 paratype), Marinduque; CAS 34154 (7 paratypes), Marinduque; CAS 34190 (2 paratypes), Ragay Gulf; CAS 34197 (9 paratypes), Camarines Sur; CAS 34205 (1 paratype), Marinduque; CAS 34272 (1 paratype), Ragay Gulf; CAS 34278 (4 paratypes), Marinduque; CAS 34286 (3 paratypes), Marinduque; CAS 34401 (1 paratype), Balayan Bay; CAS 34426 (1 paratype), Batangas, Luzon; CAS 34468 (1 paratype), Balayan Bay; CAS 46966 (4 paratypes), Quezon; SMNS 8510 (2), Occidental Mindoro; SMNS 9097 (1), Occidental Mindoro; USNM 150916 (1), Cabuyan Grande Island.

Callionymus kaianus Günther, 1880 (all Kai Islands, Maluku, Indonesia): BMNH 1879.5.14.565 (holotype); ZMUC P.6498 (1); ZMUC P.6499 (1).

Callionymus kailolae Fricke, 2000: AMS I.22807-021 (holotype), north of Port Hedland, Western Australia.

Callionymus kanakorum Fricke, 2006: MNHN 2000-5519 (holotype), Grande Terre, New Caledonia; SMNS 8550 (1 paratype), Grande Terre, New Caledonia; SMNS 12047 (1 paratype), Grande Terre, New Caledonia.

Callionymus kotthausi Fricke, 1981: ZIM 5535 (holotype), Cochin, India; ZIM 5536 (11 paratypes), Cochin, India.

Callionymus moretonensis Johnson, 1971 (all Australia): AMS I.15608-001 (holotype), Cape Moreton, Queensland; CAS 24764–24767 (4 paratypes), Cape Moreton, Queensland; QM I.9156–I.9157 (2 paratypes), Cape Moreton, Queensland; SMNS 12172 (5), Arafura Sea, Northern Territory; SMNS 12173 (8), Arafura Sea, Northern Territory; SMNS 14791 (13), off Newcastle, New South Wales; WAM P.25739-003 (1), Cape Moreton, Queensland.

Callionymus ochiaii Fricke, 1981: FAKU 23261 (holotype), Kagoshima Prefecture, Japan; FAKU 23257–23260 and 23275 (5 paratypes), Kagoshima Prefecture, Japan; USNM 160485 (1), Goto Island, Japan.

Callionymus regani Nakabo, 1979 (all Saya de Malha Bank, western Indian Ocean): HUMZ 72408 (holotype); BMNH 1908.3.23.263 (1); HUMZ 72325 (1 paratype); HUMZ 72359 (1 paratype); HUMZ 42405 and 42407 (2 paratypes); HUMZ 73395 (1 paratype); HUMZ 73448–73449 (2 paratypes); HUMZ 73681 (1 paratype).

Callionymus semeiophor Fricke, 1983: NTM S.10764-001 (holotype), Sumbawa, Indonesia; NTM S.10760-002 (1 paratype), Lombok, Indonesia.

Callionymus sokonumeri Kamohara, 1936: NSMT P.21026–21027 (2), Mimase, Japan; NSMT 23873 (1), Kagoshima, Japan.

Callionymus whiteheadi Fricke, 1981: BMNH 1980.6.20.1 (holotype), Bali, Indonesia; BMNH 1980.11.25.2 (1 paratype), Java, Indonesia.

3 Taxonomy

Callionymus (Bathycallionymus) profundus **n. sp.**
(Figs. 1, 2A)

Callionymus bentuviai (misidentified, non Fricke, 1981): Baranes & Golani 1993: 309, pl. 14, fig. 47 (Gulf of Aqaba, Red Sea, 410–480 m depth).

Holotype: HUJ 16989, male, 65.1 mm SL, Israel, Eilat, Gulf of Aqaba (Gulf of Eilat), Red Sea, coll. A. Baranes, 11 Feb. 1992.

Diagnosis

A *Callionymus* of the subgenus *Bathycallionymus* with a small branchial opening; head short (3.9 in SL); eye large (2.04 in head length); preopercular spine with a small antrorse barb and a larger antrorse spine, and a strong antrorse spine at its base, ventral margin smooth; first dorsal fin slightly higher than second dorsal fin (male); second dorsal fin distally straight; caudal fin distally slightly pointed, with 2 median unbranched rays bearing short filaments; first dorsal fin with basal black spot reaching from second to third membranes, third membrane with a distal black margin; second dorsal fin with vertical dark grey bars; anal fin distally black, tip of fin rays also black.

Description

D IV + viii,1; A viii,1; P_1 ii,15–16,i–ii (total 18–20); P_2 I,5; C (ii),i,3,ii,2,(iii). Proportions are given in Tab. 1.

Body elongate and depressed. Head depressed. Eye large. Interorbital very narrow. Preopercular spines broken, only left spine partially preserved; shape of main tip unknown, ventral margin smooth, base with a strong antrorse spine, and 1 small antrorse barb and 1 large, curved point on dorsal margin, formula $1\frac{2}{-}1$. Cephalic lateral-line system with a preorbital branch, a short suborbital branch with a downward extension, a disconnected preopercular branch, a short, separate mandibular branch, and a supraoccipital commissure connecting lines of opposite sides. Occipital region smooth, without bony protuberances. Body lateral-line system without dorsal branches, but with one commissure dorsally on the caudal peduncle connecting the lateral lines of the opposite sides; lateral line reaching along about half the length of the upper median unbranched caudal-fin ray. Urogenital papilla short.

First dorsal fin slightly higher than second dorsal fin, without filaments, and the membranes moderately incised. Second dorsal fin distally straight, rays unbranched, the last divided at its base, posterior branch of last ray slightly elongate. Anal fin beginning on vertical through 2nd membrane of second dorsal fin. Anal fin distally straight; anal-fin rays unbranched, the last divided at its base. Pectoral fin reaching to base of 2nd anal-fin ray when adpressed.

Tab. 1. Proportions of the holotype of *Callionymus profundus* n. sp., catalogue number HUJ 16989.

Head length in SL	3.9
Body depth in SL	7.3
Body width in SL	6.1
Caudal peduncle length in SL	5.2
Caudal peduncle depth in SL	24.0
Eye diameter in head length	2.04
Preorbital length in head length	3.9
Interorbital distance in head length	22.3
Upper jaw length in head length	3.0
Urogenita papilla length in head length	17.0
Predorsal (1) length in SL	3.2
Predorsal (2) length in SL	2.2
Preanal length in SL	2.0
Prepectoral length in SL	2.7
Prepelvic length in SL	3.9
Length of 1st spine of first dorsal fin in SL	5.5
Length of 2nd spine of first dorsal fin in SL	5.8
Length of 3rd spine of first dorsal fin in SL	5.7
Length of 4th spine of first dorsal fin in SL	8.8
Length of 1st ray of second dorsal fin in SL	6.0
Length of 5th ray of second dorsal fin in SL	5.5
Length of last ray of second dorsal fin in SL	6.0
Length of 1st ray of anal fin in SL	11.8
Length of 5th ray of anal fin in SL	8.2
Length of last ray of anal fin in SL	6.2
Pectoral-fin length in SL	5.0
Pelvic-fin spine length in SL	12.8
Pelvic-fin length in SL	3.5
Caudal-fin length in SL	2.6

Pelvic fin reaching to base of 1st anal fin membrane when adpressed. Membrane connecting 5th pelvic-fin ray with pectoral-fin base ending opposite 10th pectoral-fin ray (counted from above). Caudal fin distally slightly pointed, with the two median unbranched rays elongate, with short filaments.

Colour in life (Fig. 1): Head and body beige, ventrally white; thorax with dark grey pigment. Back with irregularly arranged dark grey, white and orange spots. Snout with dark grey pigment spots. Eye dorsally with dark grey pigment. Opercle with small dark grey, white and orange spots. Upper edge of pectoral-fin base surrounded by a semicircular black band. Sides of body with two rows of black blotches below the lateral line, arranged in groups of 2–4. Dorsal side of caudal peduncle with blotches of dark grey pigment. First dorsal fin grey, with a large black blotch basally on second to third membranes surrounded by white areas. Third membrane with a distal black margin. Second dorsal fin white, with vertically orientated oblique dark grey streaks; membranes with a distal grey margin, membrane between the branches of last ray distally black. Anal fin basally light grey, with two white spots on each ray, distal margin with a black streak, tips of fin rays also black. Caudal fin pale, distal parts of uppermost and lowermost rays and membranes white, lower half with a narrow dark grey streak, membrane between median unbranched rays distally dark grey. Pelvic fin white, with two central and a group of distal grey spots. Pectoral fin translucent, without markings.

Sexual dimorphism unknown (only the male holotype known).

Distribution

The species is only known from the type locality, Israel, Eilat, Gulf of Aqaba (Gulf of Eilat), Red Sea. The holotype was collected at a depth of 410–480 m. The species is probably restricted to deep water of the Gulf of Aqaba (Gulf of Eilat).

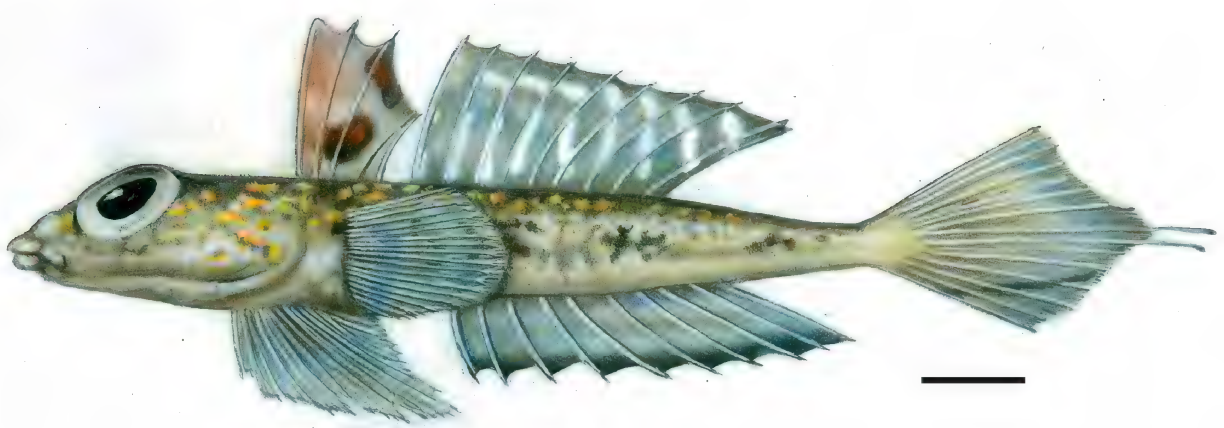

Fig. 1. *Callionymus profundus* n. sp., colour pattern after collection. – HUJ 16989, holotype, male, 65.1 mm SL, Israel, Eilat, Gulf of Aqaba (Gulf of Eilat), Red Sea. Painting by Tuvia Kurz. – Scale: 10 mm.

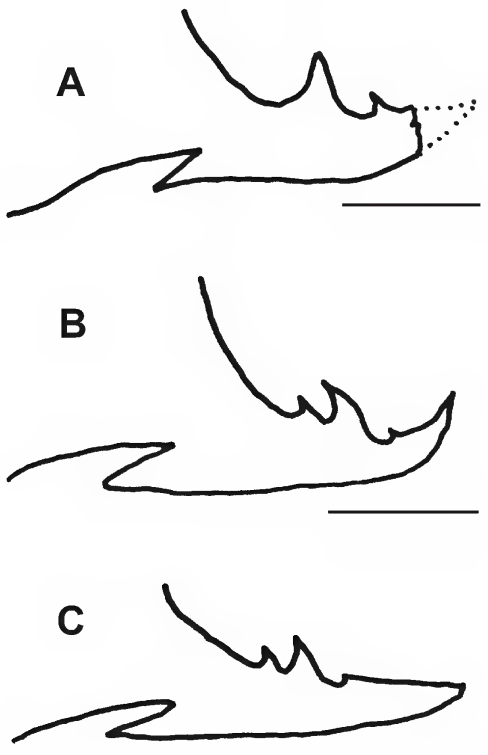

Fig. 2. Left preopercular spines of *Callionymus* spp. – **A**. *C. profundus* n. sp., HUJ 16989, holotype, male, 65.1 mm SL, Israel, Red Sea. **B**. *C. africanus*, RMNH 19984, female, 83.0 mm SL, Somalia Basin seamount. **C**. *C. bentuviai*, HUJ 6675, male, 84.9 mm SL, Eritrea, Red Sea. – Scales: 2 mm.

Habitat

This species was trawled from soft bottom habitats. It is probably restricted to the Gulf of Aqaba, which is characterised by an exceptionally high salinity (Wyrtki 1971, Fricke 1988). The Gulf of Suez has a similar salinity, but it is much too shallow to host this deep water dragonet species. As soft bottom habitats at this depth are very limited in the Gulf of Aqaba, and as the distribution of callionymid fishes of the subgenus *Callionymus (Bathycallionymus)* is typically very patchy, with a social structure of small, highly isolated harem groups (Fricke, 1988), the new species is probably extremely rare.

Affinities

The new species is a member of the subgenus *Callionymus (Bathycallionymus)* as defined by Fricke (1981: 350) and Nakabo (1982: 86) (see above in the introduction). It is similar to *Callionymus africanus* (Kotthaus, 1977) (Kotthaus 1977: 38, as *Diplogrammus africanus*) from the northwestern Indian Ocean, and *Callionymus bentuviai* Fricke, 1981 (Fricke 1981: 366, fig. 12) from the southern Red Sea in having the second dorsal and anal fins with a straight distal margin, the first dorsal fin without filaments and the caudal fin bearing two filaments. Other species of the subgenus have the second dorsal and/or anal fin with convex distal margins, one or more filaments in the first dorsal fin of the male, and one or no filament of the caudal fin. The new species differs from *Callionymus bentuviai* in having just a single dorsal point on the preopercular spine (additional to the small antrorse barb and the main tip; two points in C. *bentuviai*), the large black blotch on the first dorsal fin anteriorly only reaching to second spine, not to first spine (reaching to first spine in *C. bentuviai*), the pelvic fin distally without a dark area, but only with a few dark spots (with a dark area but without dark spots in *C. bentuviai*), and the second membrane of the first dorsal fin of the male not deeply incised (deeply incised in *C. bentuviai*). It is distinguished from *C. africanus* in having just a single dorsal point on the preopercular spine (additional to the small antrorse barb and the main tip; two points in those species; see Fig. 2), in the distally black third membrane of the first dorsal fin (distally pale in *C. africanus*), and the colouration of the second dorsal fin (with vertical dark grey bars in *C. profundus* n. sp.; with 2 horizontal rows of dark spots and 3 rows of white spots in *C. africanus*).

A revised key to callionymid fish species of the Red Sea and western Indian Ocean is presented below to distinguish *Callionymus profundus* n. sp. from potentially co-occurring species. Also, a key to species of the subgenus *Callionymus (Bathycallionymus)* is provided to characterise the new species among other related species.

Remarks

The type locality of this new species represents the northernmost record of the subgenus *Bathycallionymus*.

In an alternative classification by Nakabo (1982), *Callionymus profundus* n. sp. would be a member of the genus *Bathycallionymus*. Here, we treat *Bathycallionymus* as a subgenus of *Callionymus* (see introduction).

The date of collection of the holotype was erroneously given as 11 Feb. 1993 by Baranes & Golani (1993: 309); in fact, it is 11 Feb. 1992.

4 Key to species of Callionymidae of the Red Sea and western Indian Ocean

1 Opercle with a free flap of skin. **2**
– Opercle without a free flap of skin. **7**
2 Body with lateral fold of skin below LL; lower lip without fleshy papillae; A rays unbranched. .....(*Diplogrammus*) **3**
– Body without lateral fold of skin below LL; dorsal margin of lower lip with a row of erect fleshy papillae; A rays branched. ..... (*Draculo*) **6**
3 Second spine of first dorsal fin longer than first spine of second dorsal fin. **4**
– Second spine of first dorsal fin as long as or shorter than first spine of second dorsal fin. **5**

4 Body depth 12–13 % of SL; pectoral-fin rays 16–17. ..... ***Diplogrammus gruveli*** Smith, 1963
– Body depth 17–18 % of SL; pectoral-fin rays 20. ..... ***Diplogrammus pygmaeus*** Fricke, 1981
5 First spine of first dorsal fin with a long filament in male; main tip of preopercular spine upcurved; anal fin without distal black margin. ..... ***Diplogrammus infulatus*** Smith, 1963
– First spine of first dorsal fin without a filament in male; main tip of preopercular spine straight; anal fin with narrow distal black margin. ..... ***Diplogrammus randalli*** Fricke, 1983
6 First dorsal fin with a single spine; second dorsal fin with 11 rays (the last divided at its base); anal fin with 12 branched rays (the last divided at its base). ..... ***Draculo celetus*** (Smith, 1963)
– First dorsal fin with 4 spines; second dorsal fin with 9–10 rays (the last divided at its base); anal fin with 10 branched rays (the last divided at its base). ..... ***Draculo maugei*** (Smith, 1966)
7 Lateral line with numerous long branches above and below; preopercular spine simple, without accessory spines. ..... ***Paracallionymus costatus*** (Boulenger, 1898)
– Lateral line mostly unbranched; preopercular spine with one or more accessory spines. **8**
8 Snout shorter than eye diameter; soft D rays branched (in specimens longer than 3 cm); gill opening sublateral; no antrorse spine present at preopercular spine base. ..... (*Synchiropus*) **9**
– Snout equal to, or longer than, eye diameter; soft D rays unbranched; gill opening dorsal; antrorse spine at base of preopercular spine. ..... (*Callionymus*) **14**
9 Preopercular spine with 1 dorsal point additional to main tip. **10**
– Preopercular spine with 2–5 dorsal points additional to main tip. **11**
10 Caudal fin pale or with 1 distal dark bar; caudal fin length 33–40 % of SL; second dorsal fin pale or with distal dark bar. ..... ***Synchiropus monacanthus*** Smith, 1935
– Caudal fin with 2 dark bars; caudal fin length 27–32 % of SL; second dorsal fin spotted. ..... ***Synchiropus stellatus*** Smith, 1963
11 Preopercular spine with 2 dorsal points additional to main tip. **12**
– Preopercular spine with 3–5 dorsal points additional to main tip. **13**
12 Main tip of preopercular spine straight; preopercular spine always without small antrorse spines at base; first dorsal fin dark, striped. ..... ***Synchiropus marmoratus*** (Peters, 1855)
– Main tip of preopercular spine upcurved; preopercular spine usually with 1–2 small antrorse points at base; first dorsal fin light, with dark blotches. ..... ***Synchiropus sechellensis*** Regan, 1908
13 Dorsal spines filamentous in male; lower pectoral-fin base without black spots. ..... ***Synchiropus postulus*** Smith, 1963
– Dorsal spines not filamentous in male; lower pectoral-fin base with black spot. ..... ***Synchiropus minutulus*** Fricke, 1981
14 Both dorsal and ventral margins of preopercular spine with antrorse spines or serrae. **15**
– Only dorsal margin of preopercular spine with curved points or antrorse serrae (1–2 antrorse spines may be present at base of preopercular spine). **17**
15 Snout densely covered with numerous spines. ..... ***Callionymus spiniceps*** Regan, 1908
– Snout without spines (occasionally except for a small preorbital spine). **16**
16 Overeye tentacle present; lower margin of preopercular spine with 1–3 curved points additional to antrorse spine at base. ..... ***Callionymus muscatensis*** Regan, 1905
– Overeye tentacle absent; lower margin of preopercular spine with 4–9 curved points additional to antrorse spine at base. ..... ***Callionymus oxycephalus*** Fricke, 1980
17 Upper margin of preopercular spine with small antrorse serrae. **18**
– Upper margin of preopercular spine with large curved points (occasionally with one additional antrorse serra). **27**
18 Second dorsal fin with 8 rays (the last divided at its base). **19**
– Second dorsal fin with 9 rays (the last divided at its base). **22**
19 Anal fin with 7 rays (the last divided at base). **20**
– Anal fin with 8 rays (the last divided at base). **21**
20 Main tip of preopercular spine upcurved; dorsal margin of preopercular spine with 5–6 small antrorse serrae. ..... ***Callionymus flavus*** Fricke, 1983
– Main tip of preopercular spine straight; dorsal margin of preopercular spine with 8–15 small antrorse serrae. ..... ***Callionymus delicatulus*** Smith, 1963
21 First spine of first dorsal fin filamentous; anal fin distally black. ..... ***Callionymus margaretae*** Regan, 1905
– First dorsal fin without filaments; anal fin pale. ..... ***Callionymus tenuis*** Fricke, 1981
22 Anal fin with 9 rays (the last divided at its base); first spine of first dorsal fin in male separate from second spine. ..... ***Callionymus filamentosus*** Valenciennes in Cuvier & Valenciennes, 1837
– Anal fin with 8 rays (the last divided at its base); first spine of first dorsal fin in male connected with second spine. **23**
23 First spine of first dorsal fin with a long filament. **24**
– First spine of first dorsal fin without a filament. **26**
24 Lower margin of caudal fin pale. ..... ***Callionymus aagilis*** Fricke, 1999
– Lower margin of caudal fin black. **25**
25 Third spine of first dorsal fin distally with black blotch; dorsal margin of preopercular spine with 6–12 small antrorse serrae. ..... ***Callionymus gardineri*** Regan, 1908 (male)
– Third spine of first dorsal fin without distal black blotch; dorsal margin of preopercular spine with 3–6 small antrorse serrae. ..... ***Callionymus margaretae*** Regan, 1905
26 Anal fin with a distal black bar. ..... ***Callionymus persicus*** Regan, 1905
– Anal fin pale... ***Callionymus gardineri*** Regan, 1908 (female)
27 First dorsal fin with 3 spines; jaws extremely protractile, forming a broad tube when protracted. ..... ***Callionymus hindsii*** Richardson, 1844
– First dorsal fin with 4 spines; jaws moderately protractile, narrow when protracted. **28**
28 Anal fin with 7 rays (the last divided at base). ..... ***Callionymus stigmatopareius*** Fricke, 1981
– Anal fin with 8 or 9 rays (the last divided at base). **29**
29 Upper margin of preopercular spine with a small antrorse barb near main tip, and with 1–2 large curved points. **30**
– Upper margin of preopercular spine without a small antrorse barb near main tip, but with one or more large curved points. **35**
30 Caudal fin distally convex or slightly pointed, with 1–2 filaments. **31**

– Caudal fin distally convex, without filaments. **32**

31 Preopercular spine with 2 curved points (additional to small antrorse barb) on dorsal side; large dark blotch on first dorsal fin anteriorly reaching to first spine; pelvic fin with a distal dark area, but without dark spots. – Southern Red Sea. .... ***Callionymus bentuviai*** Fricke, 1981

– Preopercular spine with 1 curved point (additional to small antrorse barb) on dorsal side; large black blotch on first dorsal fin anteriorly only reaching to second spine, not to first spine; pelvic fin distally without a dark area, but only with a few dark spots. – Gulf of Aqaba, northern Red Sea. .... ***Callionymus profundus* n. sp.**

32 Second dorsal fin with horizontal rows with white and/or dark blotches. .... ***Callionymus africanus*** (Kotthaus, 1977) (male)

– Second dorsal fin with vertical black streaks. **33**

33 Black blotch on first dorsal fin on first or second to third membranes; cheeks pale. .... ***Callionymus kotthausi*** Fricke, 1981

– Black blotch on first dorsal fin only on third membrane; cheeks with spots or suborbital dark streak. **34**

34 Suborbital dark streak present; second half of anal fin black. ..... ***Callionymus africanus*** (Kotthaus, 1977) (female)

– No suborbital dark streak, but many brown blotches encircled with darker brown on cheeks; anal fin pale, distal margin dusky. ..... ***Callionymus regani*** Nakabo, 1979

35 Dorsal margin of preopercular spine with 1–2 curved points. **36**

– Dorsal margin of preopercular spine with 3–7 curved points. **37**

36 Main tip of preopercular spine long, curved; preopercular spine not upcurved at base. .... ***Callionymus carebares*** Alcock, 1890

– Main tip of preopercular spine short, straight; preopercular spine upcurved at base. .... ***Callionymus mascarenus*** Fricke, 1983

37 Caudal fin elongate, with 2 long median filaments. .... ***Callionymus cooperi*** Regan, 1908

– Caudal fin distally convex, without filaments. **38**

38 Second spine of first dorsal fin longer than first (may both be filamentous in males). .... ***Callionymus erythraeus*** Ninni, 1934

– Second spine of first dorsal fin shorter than first. **39**

39 Preopercular spine strongly upcurved at base; male with black blotch surrounded by white posteriorly on first dorsal fin. ..... ***Callionymus mascarenus*** Fricke, 1983

– Preopercular spine only slightly upcurved at base; male without black blotch posteriorly on first dorsal fin. .... ***Callionymus marleyi*** Regan, 1919

5 Key to the species of subgenus *Bathycallionymus* of the genus *Callionymus*

1 Dorsal margin of preopercular spine usually without a small antrorse barb additional to large, curved points; head in SL 2.7–3.1. ..... ***Callionymus carebares*** Alcock, 1890

– Dorsal margin of preopercular spine with a small antrorse barb additional to large, curved points; head in SL more than 3.2. ..... **2**

2 Second dorsal and anal fins very high, males with convex distal margins. **3**

– Second dorsal and anal fins relatively low, with straight distal margins. **8**

3 First spine of first dorsal fin filamentous. **4**

– First spine of first dorsal fin not filamentous. **7**

4 Second dorsal fin high, first ray about 1.1, firth ray about 0.8 in head length; preopercular spine with 1 large curved point (additional to 1 small antrorse barb) on its dorsal side. .... ***Callionymus altipinnis*** Fricke, 1981

– Second dorsal fin relatively low, first ray about 1.0, fifth ray about 0.9 in head length; preopercular spine with 2 curved points (additional to 1 small antrorse barb) on its dorsal side. **5**

5 Caudal fin distally convex, with 1 long filament; filament on first spine of first dorsal fin long, nearly twice as long as second spine. – Taiwan. .... ***Callionymus formosanus*** Fricke, 1981

– Caudal fin distally convex, with 2 filaments; filament on first spine of first dorsal fin relatively short, not twice as long as second spine. – Indonesia, Australia. **6**

6 First dorsal fin with a large black blotch covering most of third membrane, but without a black blotch on first membrane; second dorsal fin pale, without markings; upper half of pectoral-fin base pale. – Northwestern Australia. .... ***Callionymus bifilum*** Fricke, 2000

– First dorsal fin with a large black blotch distally on second and third membranes, and a small black blotch distally on first membrane; second dorsal fin with vertical dark streaks; upper half of pectoral-fin base with a dark blotch. – Western Indonesia. ..... ***Callionymus semeiophor*** Fricke, 1983

7 Main tip of preopercular spine long and slender; distal half of anal fin black, tips of fin rays white; distal margin of caudal fin regularly shaped; black blotch on third membrane of first dorsal fin relatively large, central in position (not reaching distal margin). ..... ***Callionymus guentheri*** Fricke, 1981

– Main tip of preopercular spine short; anal fin with a distal black streak on each membrane, distal two-thirds of membrane and tips of fin rays dark brown; distal margin of caudal fin irregularly shaped; black blotch on third membrane of first dorsal fin very small, extremely distal in position. .... ***Callionymus sokonumeri*** Kamohara, 1936

8 Caudal fin convex, without filaments. **9**

– Caudal fin convex or slightly pointed, with 1–2 filaments. **16**

9 Anal fin with a narrow distal yellow margin or colourless; sides of body with a row of indistinct brownish blotches or without blotches. **10**

– Anal fin with a dark brown or black margin; sides of body with a row of small distinct black blotches. **11**

10 First spine of first dorsal fin with a long filament, more than twice as long as second spine. – Western Indonesia. .... ***Callionymus bleekeri*** Fricke, 1983

– First spine of first dorsal fin not filamentous, about as long as second spine. – Southwestern Indian Ocean. .... ***Callionymus regani*** Nakabo, 1979

11 Main tip of preopercular spine long and slender. .... ***Callionymus kotthausi*** Fricke, 1981

– Main tip of preopercular spine short. **12**

12 First spine of first dorsal fin filamentous; pelvic fin distally spotted. **13**

– First spine of first dorsal fin not filamentous; pelvic fin distally with a dark area, but not spotted. **14**

13 First spine of first dorsal fin with a relatively long filament, at least 1.5 times as long as second spine; upper half of caudal fin spotted, but without a distal dark bar. – Wallis and Futuna. ..... ***Callionymus futuna*** Fricke, 1998
– First spine of first dorsal fin with a relatively short filament, at most 1.2 times as long as second spine; upper half of caudal fin not spotted, but with a small distal dark bar. – New Caledonia..... ***Callionymus kanakorum*** Fricke, 2006
14 First dorsal fin much higher than second dorsal fin, first spine more than 1.5 times as long as first ray of second dorsal fin... ..... ***Callionymus kailolae*** Fricke, 2000
– First dorsal fin only slightly higher than second dorsal fin, first spine not more than 1.2 times as long as first ray of second dorsal fin. **15**
15 Preopercular spine with 1 dorsal point (additional to a small antrorse barb); pectoral-fin base with a large dark brown area; back marbled with olive green in fresh specimens; opercle with large white spots; lower part of caudal fin distally black; second dorsal fin with a basal row of dark blotches. .... ***Callionymus whiteheadi*** Fricke, 1981
– Preopercular spine with 2 dorsal points (additional to a small antrorse barb); pectoral-fin base with two black streaks; back yellowish brown, with white blotches surrounded by semicircular dark bands; opercle with small dark spots; lower part of caudal fin with a broad curved dark band, but distally colourless; second dorsal fin without a basal row of blotches or spots. ..... ***Callionymus africanus*** (Kotthaus, 1977) (female)
16 First spine of first dorsal fin with a long filament. **17**
– First spine of first dorsal fin without a filament. **19**
17 Main tip of preopercular spine short, largest point on its dorsal margin with a basal hook; second dorsal fin colourless, with transverse white lines; sides of body with a row of distinct black blotches. .....***Callionymus kaianus*** Günther, 1880
– Main tip of preopercular spine long and slender, largest point on its dorsal margin without a basal hook; second dorsal fin with rows of blotches; sides of body with a row of indistinct brownish blotches. **18**
18 Anal fin with a dark margin; second dorsal fin with two rows of white blotches and a distal dark margin; main tip of preopercular spine about 2.5–3.0 times as long as largest point on the dorsal side; body with light blotches edged with semicircular dark lines.... ***Callionymus moretonensis*** Johnson, 1971
– Anal fin pale, without a dark margin; second dorsal fin with a basal and 2–3 more distal rows of dark spots; main tip of preopercular spine about 1.0–1.5 times as long as largest point on the dorsal side; body with minute blackish spots forming rings and blotches. ..... ***Callionymus ochiaii*** Fricke, 1981
19 Caudal fin with 2 long filaments which are nearly twice as long as remainder of fin; large dark blotch on first dorsal fin anteriorly reaching to first spine. .... ***Callionymus bentuviai*** Fricke, 1981
– Caudal fin with 1 or 2 relatively short filaments which are not longer than the remainder of the fin; large dark blotch on first dorsal fin in male anteriorly at most reaching to second spine, not to first spine. **20**
20 Preopercular spine with 1 curved point (additional to small antrorse barb) on dorsal side. – Gulf of Aqaba, northern Red Sea. .....***Callionymus profundus* n. sp.**
– Preopercular spine with 2 curved points (additional to small antrorse barb) on dorsal side. – Indian Ocean or western Pacific. **21**
21 First dorsal fin with a large dark area, with a branch reaching anteriorly to first spine; second dorsal fin with vertical dark streaks. .....***Callionymus semeiophor*** Fricke, 1983 (female)
– First dorsal fin with a black blotch on third membrane (rarely with an additional blotch on the same membrane), occasionally reaching from second to fourth spines; second dorsal fin with rows of dark and/or white spots (but without vertical dark streaks)..... **22**
22 Cephalic lateral line in postorbital region with a long branch running downwards; first dorsal fin with a large black blotch basally on the third membrane, with 1–2 branches reaching to second membrane; pectoral-fin base with 2 dark streaks; anal fin with a distal black margin (usually including tips of fin rays); caudal fin without two median transverse black lines; second dorsal fin with a basal, a median and a distal row of light spots and 2 median rows of black spots. ....***Callionymus africanus*** (Kotthaus, 1977)
– Cephalic lateral line in postorbital region without a long branch; first dorsal fin with a relatively small distal black blotch on the third membrane; pectoral-fin base with a dark area; distal half of anal fin black, tips of fin rays white; caudal fin with two median transverse black lines; second dorsal fin with a basal and a median row of black spots. ....***Callionymus guentheri*** Fricke, 1981 (female)

6 References

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First documented record of the ocean sunfish, *Mola mola* (Linnaeus), from the Sea of Oman, Sultanate of Oman (Teleostei: Molidae)

Laith A. Jawad

Abstract

The first assured record of the ocean sunfish, *Mola mola* (Linnaeus, 1758), in Omani waters is reported based on a specimen of 1350 mm total length which has stranded on the coast of Quriat City, 120 km north of Muscat, the capital of Oman. Morphometric and meristic data are provided and compared with those of several specimens of this species from other parts of the world.

Keywords: Sea of Oman; Molidae; range extension.

Zusammenfassung

Der Mondfisch, *Mola mola* (Linnaeus, 1758), wird zum ersten Mal für Oman bestätigt. Der Nachweis basiert auf einem 1350 mm langen Exemplar, das an der Küste von Quriat City, 120 km nördlich der omanischen Hauptstadt Muscat gestrandet ist. Morphometrische und meristische Daten dieses Exemplares werden gegeben und mit einigen anderen Belegen weltweit verglichen.

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1 Introduction

The species of the ocean sunfish family Molidae are epipelagic and characterized by having laterally compressed bodies that have an abbreviated or truncated appearance posteriorly (Fraser-Brunner 1951). The caudal fin in molids is replaced by a vertically elongate pseudocaudal fin (clavus) that lacks the normal components of the terminal urostylar vertebra and associated hypurals, etc.; molids also lack pelvic fins and pelvic girdles, and have no spines in the median fins that protrude prominently from the rear part of the body and which are the main source of propulsion (Tyler 1980).

Because of their often strange shapes, representatives of the tetraodontiform fishes, including ocean sunfishes, were well-known to the ancient Roman, Greek, Egyptian, and Chinese naturalists. Much later, at the very beginning of binomial nomenclature, the ocean sunfish was recognized as *Tetraodon mola* Linnaeus 1758, and shortly thereafter it was placed in *Mola* Koelreuter, 1766 (see Tyler 1980 for a history of tetraodontiform systematics). Although many generic and specific synonyms of *Mola mola* have been proposed since then (Eschmeyer 2012), the taxonomy of this species has become highly stable in recent decades, and a large literature now exists on its morphology and natural history.

The most comprehensive taxonomic revision of the family is that of Fraser-Brunner (1951), in which five species in three genera were distinguished. At present, four species are recognized: *Ranzania laevis* (Pennant, 1776), *Masturus lanceolatus* (Liénard, 1840), *Mola mola* and *M. ramsayi* (Gigoli, 1883). The latter species is infrequently mentioned in taxonomic treatments (Nelson 1994, Parenti 2003). Both morphological and molecular approaches have been used to study the relationships among the currently recognized genera. Santini & Tyler (2002), using a large data set of morphological characters, and Yamanoue et al. (2004), using molecular data, found strong support for the conventional hypothesis (Fraser-Brunner 1951, Tyler 1980) of a sister taxon relationship between the genera *Masturus* and *Mola*, with *Ranzania* being the basal clade within the family.

Three species of molids, *Ranzania laevis*, *Masturus lanceolatus*, and *Mola ramsayi*, have been recorded recently from the Sea of Oman (Jawad et al. 2010, 2012), but until now *Mola mola* has not been known with certainty

from the coast of Oman. Additionally, *Ranzania laevis* has been reported from the northern-most region of the Arabian Gulf (Jawad et al. 2011).

Mola mola inhabits warm to cold temperate waters of all oceans (Froese & Pauly 2010). It has been recorded in the Eastern Pacific region from British Columbia, Canada to Peru and Chile. It is also known in the Western Pacific from Japan to Australia. In the Eastern Atlantic, it has been recorded from Scandinavia to South Africa (including the western Baltic, Mediterranean). In addition, *M. mola* is reported in the Western Atlantic from Newfoundland, Canada to Argentina.

The nearest confirmed record of *Mola mola* to the Sea of Oman is that of Asadi et al. (1997) who mention this species in their book, but do not give the exact location. Another record near Oman is that of Al-Baz et al. (1999) from Kuwait.

Herein is provided the first documented evidence of *M. mola* in Omani waters, which also represents the second confirmed record for this species from the northern part of the Indian Ocean.

Acknowledgements

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2 Record of *Mola mola* from Oman

In April 2012, an unusual occurrence of *M. mola* was recorded along the coasts of the Oman Sea at the city of Quriat (22°35'10.22"N, 59°30'18.91"E), 120 km north of Muscat City. The specimen (Fig. 1) was found stranded on the shore of Quriat City, having been tossed ashore by the swell. The fish was 1350 mm in total length and weighed 89 kg. It is deposited in the fish collection of the Marine Science and Fisheries Centre, Ministry of Agriculture and Fisheries Wealth, Muscat, Sultanate of Oman, catalogue number OMMSTC 1097.

Morphometric and meristic details of this specimen are given in Tab. 1. Thirteen body proportions were measured, including the total length (TL), measured horizontally from the tip of the snout to the posterior edge of the clavus; preorbital length, measured from the tip of the snout to the anterior edge of the orbit; eye diameter, i. e. the distance between the anterior and posterior edges of the orbit; preopercular opening length, measured from the tip of the snout to the edge of the opercular slit; predorsal fin length, measured from the tip of the snout to the anterior edge of the dorsal fin base; height of dorsal fin, measured vertically from the base to the distal tip of the dorsal fin; distance between bases of dorsal and anal fins, measured vertically between the bases of the dorsal and anal fins; prepectoral fin length, measured from the snout tip to the anterior edge of the pectoral fin; height of anal fin, measured vertically from the base of the anal fin to the distal tip of the anal fin; preanal fin length, measured horizontally from the snout tip to the anterior edge of the anal fin base; preanus length, measured horizontally from the tip of the snout to the anus; maximum body depth, measured vertically at the widest points of the body margin; and clavus length; measured vertically from the ventral to the dorsal edges of the clavus. Morphometric and meristic details were determined using standard methods given by Tyler (1980) (Tab. 1).

Tab. 1. Morphometric and meristic characteristics of *Mola mola* in the Sea of Oman compared with specimens from the literature. – TL = total length; – = not available.

	Present study	Al-Baz et al. 1999, Kuwait	Brito 2003, Chile
Morphometric characters (mm) and ratios (percent of TL)			
TL	1350	1800	955
Eye diameter	65 (4.8)	–	42 (4.4)
Preorbital length	19.8 (1.5)	–	13.5 (1.4)
Preopercular opening length	452 (33.5)	–	–
Predorsal fin length	784 (58.1)	–	545 (57.1)
Hight of dorsal fin	651 (48.2)	–	390 (40.8)
Distance between base of dorsal and anal fin	840 (62.2)	–	–
Prepectoral fin length	475 (35.2)	–	323 (33.8)
Hight of anal fin	678 (50.2)	–	420 (43.9)
Preanal fin length	715 (52.9)	–	–
Preanus length	665 (49.3)	–	–
Maximum body depth	942 (69.8)	1130 (62.8)	–
Clavus height	82.5 (6.1)	85 (4.7)	–
Meristic characters			
Dorsal soft rays	16	–	16
Anal soft rays	14	–	16
Pectoral fin rays	12	–	12

Body with a tough covering of thick collaginous skin, which in turn is covered by scales modified as denticles. Clavus, a rudder-like structure, replacing the aborted caudal fin. Dorsal and anal fins very high, with short bases. Pectoral fins small and rounded, directed upward. Mouth very small; teeth fused with jaw bones to form a parrot-like beak. Four gills, with a reduced gill slit located at the base of the pectoral fin. Clavus supported by 12 rays, 8 of which bear ossicles; the ossicles widely separated, completely covered with cuticle, which grows beyond the edge of the

Fig. 1. Fresh specimen of *Mola mola*, OMMSTC 1097,1350 mm total length, Quriat City, Sultanate of Oman.

ossicles and forms lobes in large specimens, ossicles found on paraxial rays united to form larger ossicles. Smooth band of reduced denticles at base of clavus between dorsal and anal fins. Grey silver colour.

Mola mola differs from *M. ramsayi* in the following set of characters given by Fraser-Brunner (1951): skin rough with small denticles including a band of somewhat reduced denticles between the bases of the dorsal and anal fins; ossicles widely separated, less broad than the spaces between them; clavus with about 12 fin rays, of which 8 or 9 bear ossicles.

3 Discussion

Relatively few studies have provided extensive morphological measurements for *M. mola* specimens collected from around the world (Al-Baz et al. 1999, Brito 2003). These morphological data are compared with that of the Omani specimen in Tab. 1. Al-Baz et al. (1999) reported a specimen from the Kuwait coast, Brito (2003) described another one from west of Las Cruces (33°31'S), Chile.

The recent specimen from Oman could have become stranded for the following possible reasons: (1) net entanglement followed by stress; (2) susceptibility to shark attacks; (3) locomotion difficulty stemming from injuries and exhaustion; (4) body striking the reefs that form a barrier before arriving at the site where the specimen was found. There were several fishing net marks revealing that the Omani specimen must have been entangled in a fishing net and suffered stress and trauma. Such an unhealthy state would make the specimen susceptible to attacks from predators and probably from parasites. Accidental entanglement in fishing gear is one of the main threats to sunfish populations (Joung et al. 2005, Akyol et al. 2005, Araújo et al. 2010).

There are several possible explanations for the presence of this fish in the coastal waters of the Sea of Oman. *Mola mola* is a strictly marine species and has different ecological preferences or requirements during various periods of its lifetime: for example, it has a larval pelagic existence in coastal waters (Fraser-Brunner 1951). It is premature to assess whether the present population of *M. mola* is represented only by a few visitors in a new area or whether it is a well-established population hitherto undetected, probably due to a lack of ichthyological expeditions and fishery surveys. Thus, there is a need to investigate further the frequency of occurrence of *M. mola* and other molids in the Sea of Oman and to study the biological characteristics of these species in order to determine whether they have established sustainable populations in this region.

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Type specimens of mammals in the collection of the Museum of Natural History Stuttgart

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Abstract

The present catalogue documents all the type specimens found in the mammalogical collections of the Museum of Natural History, Stuttgart. We registered 78 primary types (holo-, lecto-, neo-, syntypes) and 158 paratypes or paralectotypes. Approximately half of the type specimens are vouchers for species described by Theodor von Heuglin who thereby laid the foundation for a valuable scientific collection in Stuttgart.

Keywords: Type specimens, mammal collection, Museum of Natural History Stuttgart, Theodor von Heuglin.

Zusammenfassung

Der vorliegende kommentierte Typenkatalog behandelt 78 Primärtypen (Holo-, Lecto-, Neo- und Syntypen) sowie 158 Paratypen bzw. Paralectotypen, die in der Säugetiersammlung des Staatlichen Museums für Naturkunde Stuttgart ausfindig gemacht werden konnten. Etwa die Hälfte aller Typus-Exemplare wurde einst von Theodor von Heuglin während seiner Forschungsreisen in Afrika gesammelt, womit er den Grundstock für eine wissenschaftlich bedeutende Sammlung in Stuttgart legte.

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1 Introduction

The mammal collection of the Museum of Natural History Stuttgart has its origins back in the early 19th century. Since that time, the museum received a considerable amount of material from various parts of the world collected by different collectors and explorers. Among the historic specimens many were collected e. g. by Baron Carl Ferdinand Heinrich von Ludwig (Southern Africa), August Kappler (Suriname), Baron Ferdinand Jacob Heinrich von Müller (Australia) and Theodor von Heuglin (Northeast Africa). More recent specimens came from Martin Eisentraut (Africa, Europe), Fritz Dieterlen (Africa, Europe), Hans Rupp and Gerhard Nikolaus (Africa), Claus König (Europe), Giorgio Pilleri (Asia; dolphins and whales), and Willi and Gertrud Issel (worldwide, bats). Currently, the mammal collection holds approximately 60.000 specimens representing more than 1.500 species. The scientific importance of the collection lies in the large number of taxa it contains, as well as in the considerable number of type specimens included. Due to the uncertain status of many historic specimens, particularly the specimens described by Heuglin, hitherto no type catalogue of these holdings had been published. Our aim therefore was to verify the status of these historic type specimens for a first complete type catalogue.

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2 Material and Methods

For identification of the current nomenclatural and taxonomic status, all available data, from entry books and old catalogues, old specimen labels, original descriptions and relevant secondary literature (e. g. taxonomic revisions) were consulted and evaluated.

Accounts are arranged within their respective taxonomic families which, with a few exceptions, are ordered following Wilson & Reeder (2005). Where available, information about specimens is presented in the following sequence: the original species name, author, year of publication, original reference, current species

name, type category, catalogue number, sex, age, specimen format, locality, collector and date of collection, followed by any additional comments. If known, reference is made to the whereabouts of additional type specimens in other collections. Some of the old locality names in descriptions or in the entry book are no longer in use. These invalid, but original names are listed, followed by the currently used English names in quotes.

Acronyms of depositories

MTD Museum für Tierkunde, Dresden
NMW Naturhistorisches Museum, Vienna
SMNS Staatliches Museum für Naturkunde, Stuttgart
ZFMK Zoologisches Forschungsmuseum Alexander Koenig, Bonn

3 Catalogue of mammal type specimens

We identified 236 type specimens: 37 holotypes (one of it missing), 1 neotype, 6 lectotypes, 3 holo- or syntypes, 31 syntypes, and 158 paratypes or paralectotypes. These types belong to 68 described species, of which 40 are currently accepted (valid) species names. Approximately half of the type specimens are vouchers for species described by Theodor von Heuglin (Fig. 1) who thereby laid the foundation for a valuable scientific collection in Stuttgart.

Fig. 1. Theodor von Heuglin (1824–1876) (source: Wikimedia).

Cingulata Illiger, 1811
Dasypodidae Gray, 1821
Dasypus Linnaeus, 1758

Dasypus kappleri Krauss, 1862: 20. – Valid.
Lectotype: SMNS 285, female, skull, mounted specimen; primeval forests of Maroni River, Suriname, leg. Kappler, 1846.
Comment: Krauss (1862) described several males, females and juveniles. Wetzel & Mondolfi (1979) selected SMNS 285 as lectotype.

Primates Linnaeus, 1758
Cercopithecidae Gray, 1821
Theropithecus I. Geoffroy, 1843

Theropithecus obscurus Heuglin, 1863: 10. – Valid name: *Theropithecus gelada* (Rüppell, 1835).
Syntypes: SMNS 581, male, adult, skull, skin (formerly mounted specimen), Semien Mts., Abyssinia [Ethiopia], leg. T. v. Heuglin, 1855; SMNS 1032, male, adult, mounted specimen; SMNS 1033, male, juvenile, skull; SMNS 1034, male, juvenile, skull, mounted specimen; localities of 1032, 1033, 1034 Djiedda-Tal, Bäschlo, Wollo Gala [Galla = Oromo = ethnic group in Ethiopia], leg. T. v. Heuglin, March 1862.

Papio Erxleben, 1777

Papio heuglini Matschie, 1898: 81. – Valid name: *Papio anubis* (Lesson, 1827), fide Groves 2001.
Syntypes: SMNS 582, male, adult, skull, mounted specimen; SMNS 583, female, subadult, skull damaged, mounted specimen; both specimens from Shilluk Islands, White Nile, 7° N, Sudan, leg. Heuglin, 1855; SMNS 584, male, juvenile, mounted specimen, from Sennaar fide Matschie, leg. T. v. Heuglin.

Lagomorpha Brandt, 1855
Leporidae Fischer, 1817
Lepus Linnaeus, 1758

Lepus Somalensis Heuglin, 1861[a]: 5. – Valid name: *Lepus habessinicus* Hemprich & Ehrenberg, 1832.
Syntype: SMNS 749 (additional number 5534), juvenile, skull, Somali Coast, leg. T. v. Heuglin, 1858.

Lepus Berberanus Heuglin, 1861[a]: 5. – Valid name: *Lepus habessinicus* Hemprich & Ehrenberg, 1832.
Syntype: SMNS 748 (additional number 5535), adult, skull and skin, mounted specimen, Berbera, Somalia, leg. T. v. Heuglin, 1858.

Lepus microtis Heuglin, 1865: 32. – Valid (fide Hoffmann & Smith in Wilson & Reeder 2005).
Holotype: SMNS 1116 (5536), pullus, skull, "im Lande der Ridj [sic!]" [= country of Kitsch or Kidj people, White Nile], Sudan, leg. T. v. Heuglin, 1863.
Comment: Angermann & Feiler (1988) thought that the oldest available name for this species was *victoriae* Thomas, 1893,

but apparently did not consider *microtis* Heuglin, 1865. HEUGLIN's description is based on a single juvenile [pullus!] specimen, which probably is insufficient for species diagnosis.

Soricomorpha Gregory, 1910
Soricidae Fischer, 1814
Crocidura Wagler, 1832

Crocidura allex zinki HEIM DE BALSAC, 1957[a]: 151. – Valid.
Holotype: SMNS 4512, female, skull, skin, Kilimanjaro, 3550 m, Tanzania, leg. Dr. G. ZINK, Ostafrika-Expedition Prof. Dr. E. LINDNER, 27 April 1952.
Paratype: SMNS 4513, female, skin, same collecting data as holotype.

Crocidura eisentrauti HEIM DE BALSAC, 1957[b]: 616. – Valid.
Holotype: SMNS 5571, male, specimen in alcohol, skull extracted, Mt. Cameroon, Johann-Albrecht-Hütte, 2800 m, Cameroon, leg. Prof. Dr. M. EISENTRAUT, 11 February 1954.
Paratypes: SMNS 5569, male, skull, skin, Mt. Cameroon, Musake-Hütte, 2000 m, 2 February 1954, same collector as holotype; SMNS 5570, female, skull, skin, same data as holotype.

Sorex fusco murinus HEUGLIN, 1865: 36. – Valid name: *Crocidura fuscomurina* (Heuglin, 1865).
Holotype: SMNS 1103e, female, adult, skull, specimen in alcohol, Meschra el Reg [= Mashra 'ar Raqq], Kosanga-River, Sudan, 8°25'N / 29°16'E, leg. T. v. HEUGLIN, 1863.

Crocidura ferruginea HEUGLIN, 1865: 36. – Valid name: *Crocidura olivieri* (Lesson, 1827).
Holotype: SMNS 1115, skull (damaged), mounted specimen, locality according to HEUGLIN White Nile, Sudan ["aus dem Lande der Kidji-Neger"], leg. T. v. HEUGLIN, 1863.
Comment: Identified as *C. olivieri* by R. HUTTERER; formerly misidentified as *C. hedenborgi* by F. KRAUSS.

Crocidura olivieri hansruppi HUTTERER, 1980: 226. – Valid.
Holotype: SMNS 23704, male, skull, skin, Jimma, Ethiopia, leg. HANS RUPP, 23 August 1973.
Paratypes: SMNS 23697, skull and skin, 3 January 1973; SMNS 23698, skull and skin, 5 January 1973; SMNS 23701, skull and skin, 18 August 1973; SMNS 23702, skin, skull missing; all specimens same locality and collector as holotype.

Crocidura manni PETERS, 1878: 19. – Valid name: *Crocidura olivieri* (Lesson, 1827).
Lectotype: SMNS 1646a, adult female and pullus, in alcohol, Lagos, Nigeria, leg. A. MANN, December 1877.
Paralectotypes: SMNS 1646b, mounted skeleton; SMNS 1152b, male, adult, mounted specimen; same data as lectotype. A further specimen, SMNS 1152a, female, pullus, mounted specimen, is lost.
Comment: HUTTERER & HAPPOLD (1983) selected and figured a lectotype from the syntype series. Another specimen belonging to the type series is stored in Berlin (ZMB 5253).

Crocidura littoralis stenocephala HEIM DE BALSAC, 1979: 259 [in DIETERLEN & HEIM DE BALSAC (1979)]. – Valid name: *Crocidura stenocephala* (Heim de Balsac, 1979).
Holotype: SMNS 22804, male, skull, skin (body in alcohol – K 2542), Kahuzi-Biega-National Park, Zaire [= Congo R. D.], leg. F. DIETERLEN, 15 November 1972.
Comment: Described as a subspecies of *C. littoralis* but regarded as a full species by HUTTERER (1982) & DIPPENAAR (pers. comm.).

Myosorex Gray, 1838

Myosorex blarina zinki HEIM DE BALSAC & LAMOTTE, 1956: 148. – Valid name: *Myosorex zinki* (Heim de Balsac & Lamotte, 1956).
Holotype: SMNS 4505, female, skull, skin (dry body available), Kilimanjaro-SW, 3700 m, Tanzania, leg. G. ZINK, 27 August 1952.
Comment: GRIMSHAW et al. (1995) listed this species as endemic to Mt. Kilimanjaro.

Chiroptera Blumenbach, 1779
Pteropodidae Gray, 1821
Epomophorus Bennett, 1836

Epomophorus anurus HEUGLIN, 1864: 12. – Valid name: *Epomophorus labiatus* (Temminck, 1837).
Syntypes: SMNS 609 (for skull), female, skull, mounted specimen (additional number 661); SMNS 1090, male skull, mounted specimen, "Bellegas-Tal" [= Belegaz/Belghe], Abyssinia, leg. T. v. HEUGLIN, 1855; SMNS 1091, female, skull, mounted specimen, Bongo [= country of Bongo, southern part of the province of Bahr-el-Ghazal in the south of Sudan], leg. T. v. HEUGLIN, 1863/1864.

Rhinolophidae Gray, 1825
Rhinolophus Lacépède, 1799

Rhinolophus acrotis HEUGLIN, 1861[b]: 10. – Valid name: *Rhinolophus clivosus* (Cretzschmar, 1828).
Holotype: SMNS 986a, male, adult, specimen in alcohol, Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. HEUGLIN, 1861.
Paratype (?): SMNS 986b, male, juvenile, in alcohol, same data as holotype (prb. leg. T. v. HEUGLIN).
Comment: HEUGLIN described this species merely on a single specimen, a male ["einzigen Exemplar, ein Männchen"], probably No. 986a. The juvenile male No. 986b was labelled by KRAUSS as "Cotype" and had obviously been collected by HEUGLIN.

Rhinolophus denti knorri EISENTRAUT, 1960: 3. – Valid.
Holotype: SMNS 6111, male, skull, skin, Salung-Plateau near Nyembaro-Nerebili, 10 km western of Kolenté, 400 m, Guinea (former French colony), leg. HANS KNORR, 27 November 1956.
Paratypes: SMNS 6112, 6112a, two females, skulls and skins, same data as holotype, but 19 November 1956.

Rhinolophus macrocephalus Heuglin, 1877: 22. – Valid name: *Rhinolophus fumigatus* (Rüppell, 1842).
Syntypes: SMNS 1059, female specimen in alcohol, SMNS 1059b, male specimen in alcohol, Adowa (= Adwa), N-Ethiopia, leg. T. v. Heuglin, 1862.

Rhinolophus landeri guineensis Eisentraut, 1960: 3. – Valid name: *Rhinolophus guineensis* Eisentraut, 1960.
Holotype: SMNS 6103, male, skull, skin, big cave near Tahire at Mt. Kelesi River, 500 m, Guinea (former French colony), leg. Hans Knorr, 5 October 1956.
Paratypes: SMNS 6104–6108, skulls and skins; SMNS 6109, specimen in alcohol; SMNS 6113, skull and skin; Salung Plateau near Nyembaro, 10 km W of Kolenté, Guinea, leg. Hans Knorr, 19 November 1956.
Comment: According to Simmons (in Wilson & Reeder 2005) belonging to the *R. landeri* species group. Originally described as a subspecies of *R. landeri*, but see Böhme & Hutterer (1979), who demonstrated that it is a separate species.

Rhinolophus minimus Heuglin, 1861[b]: 6. – Valid name: *Rhinolophus hipposideros* (Borkhausen, 1797) [on authorship of *R. hipposideros* see Kozhurina 2006].
Holotype: SMNS 987, male, skull, specimen in alcohol; Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. Heuglin, 1861.
Comment: According to Simmons (in Wilson & Reeder 2005) *R. minimus* can be considered as subspecies of *R. hipposideros* – or even represents a distinct species, see Zagorodnyuk (1999).

Hipposideridae Lydekker, 1891
Hipposideros Gray, 1831

Hipposideros camerunensis Eisentraut, 1956: 526. – Valid.
Holotype: SMNS 5194, male, adult, skull, skin, Buea, 1000 m, cave near Native Town, Cameroon, leg. Eisentraut, 29 April 1954.
Paratypes: SMNS 5195, male adult, specimen in alcohol; SMNS 5197, female, adult, skull, specimen in alcohol; both specimens same data as holotype.
Comment: A further paratype specimen, SMNS 5196, was exchanged to ZFMK.

Hipposideros megalotis Heuglin, 1861[b]: 8. – Valid.
Holotype: SMNS 984, male, adult, skull, specimen in alcohol, Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. Heuglin, 1861.

Nycteridae Van der Hoeven, 1855
Nycteris Cuvier & Geoffroy, 1795

Nycteris labiata Heuglin, 1861[b]: 5. – Valid name: *Nycteris thebaica* E. Geoffroy, 1818.
Syntypes: SMNS 980a, male, adult, in alcohol; SMNS 980b, male, subadult, in alcohol; both specimens from Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. Heuglin, 1861.

Phyllostomidae Goldfuss, 1820 [on authorship of the family name see Mlíkovský 2006]
Choeroniscus Thomas, 1928

Choeronycteris minor Peters, 1868: 366. – Valid name: *Choeroniscus* minor (Peters, 1868).
Holotype: SMNS 441, male, adult, skull, specimen in alcohol, Suriname, leg. A. Kappler, 1851.

Platyrrhinus Saussure, 1860

Platyrrhinus chocoensis Alberico & Velasco, 1991: 238. – Valid.
Paratype: SMNS 41706, male, skull, skin, Concesión forestal Bajo Calima, Valle, Colombia, leg. M. E. Rengifo, 8 March 1986.

Molossidae Gervais, 1856
Chaerephon Dobson, 1874

Nyctinomus bivittatus Heuglin, 1861[b]: 13. – Valid name: *Chaerephon bivittatus* (Heuglin, 1861).
Lectotype: SMNS 981, male, skull, specimen in alcohol, Keren (= Cheren), Eritrea, leg. T. v. Heuglin, 1861.
Paralectotypes: SMNS 981a, female skull, specimen in alcohol; 981b, male, skull, specimen in alcohol; both specimens same data as lectotype.
Comment: Status established by Dobson (1878) ("type") according to article 74.6. ICZN.

Nyctinomus Geoffroy, 1813

Nyctinomus ventralis Heuglin, 1861[b]: 11. – Valid name: *Tadarida ventralis* (Heuglin, 1861).
Lectotype: SMNS 982, male, skull, specimen in alcohol, Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. Heuglin, 1861.
Comment: Status established and lectotype designated by Kock (1975).

Vespertilionidae Gray, 1821
Scotophilus Leach, 1821

Nycticejus flavigaster Heuglin, 1861[b]: 14. – Valid name: *Scotophilus leucogaster* (Cretzschmar, 1830).
Syntypes: SMNS 983, male, skull, specimen in alcohol; SMNS 983a, female, skull, specimen in alcohol, Keren (= Cheren), Eritrea, leg. T. v. Heuglin, 1861.
Comment: Heuglin made no accounts on number of collected/studied specimens. According to Mrs. Dr. B. Herzig (Wien) there are no further specimens in the collection of NMW.

Pipistrellus Kaup, 1829

Vesperugo papuanus orientalis Meyer, 1899: 14. – Valid name: *Pipistrellus tenuis* Temminck, 1840.
Syntype: SMNS 2301, specimen in alcohol, Bongu, Astrolabe Bai (former colony Deutsch-Neuguinea, now Papua New Guinea), ex Museum Dresden, 1899.

Comment: The specimen had been exchanged from MTD, where further 17 syntypes in alcohol existed. They got lost during World War 2 in the bombing attack against Dresden in February 1945.

Carnivora Bowdich, 1821
Herpestidae Bonaparte, 1845
Galerella Gray, 1865

Herpestes Adailensis Heuglin, 1861[c]: 17. – Valid name: *Galerella sanguinea gracilis* (Rüppell, 1835).

Holotype: SMNS 752, male, adult, skull, mounted specimen, Adail Coast, Danakil Desert, Tedjura (= Tadjoura, Djibouti), leg. T. v. Heuglin, 1858.

Comment: The name *adailensis* is synonymized for *Mungos mungo*; but SMNS 752 belongs to *Galerella sanguinea* (Rüppell, 1835). In the account of that species 25 taxa are named as subspecies (plus further synonyms), including the form *gracilis* (Wozencraft in Wilson & Reeder 2005).

Herpestes jodoprymnus Heuglin, 1861[c]: 14. – Valid name: *Galerella sanguinea gracilis* (Rüppell, 1835).

Syntype: SMNS 971, female, skull, mounted skin, Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. Heuglin, 1858.

Comment: SMNS has no information about number of studied specimens. After the present knowledge a lectotype has not been designated. Mrs. Dr. B. Herzig of the NMW informed us about two specimens from Sudan, leg. Heuglin (NMW 1170, skull, and B 2193, a separate skin).

Canidae Fischer, 1817
Canis Linnaeus, 1758

Canis mengesi lamperti Hilzheimer, 1906: 371. – Valid name: *Canis aureus* Linnaeus, 1758.

Holotype: SMNS 2394 (additional number 3960 for skull), male, skull, mounted specimen, Somalia, leg. Joseph Menges, donated by Nill (former Zoological Garden Stuttgart, 1897).

Paratype: SMNS 19000 (old inventory No. 4085), skull, mounted skeleton, Somalia, leg. Joseph Menges, donated by Nill, 1897–1899.

Comment: Originally stored in the SMNS collection as *Canis hagenbecki* (synonym of *Canis aureus*), later as *Canis aureus*.

Perissodactyla Owen, 1848
Equidae Gray, 1821
Equus Linnaeus, 1758

Asinus taeniopus Heuglin, 1861[c]: 15, 19. – Valid name: *Equus (Asinus) africanus* Heuglin & Fitzinger 1866, fide Groves & Smeenk (2007).

Lectotype: SMNS 32026, skull, adult female, near Atbara River, Sudan, leg. T. v. Heuglin.

Comment: Grubb (in Wilson & Reeder 2005) listed Heuglin's Wild Ass as a taxon (subspecies) of *Equus asinus* (Linnaeus). Groves et al. (1966) recommended *africanus* as specific name, avoiding the name *asinus* because being based upon domestic populations. Here it follow parts of the very careful investigation of Groves & Smeenk (2007): p. 121: "In the 19th-century reports on the occurrence and identity of wild asses in North-East Africa are reviewed as well as the names applied in various publications by Fitzinger and von Heuglin, respectively. The first published name for the African wild ass, *Asinus africanus* Fitzinger, 1858, is a nomen nudum. The name *Equus taeniopus* von Heuglin, 1861 is rejected as indeterminable, as it is based on an animal that cannot be identified and may have been a hybrid between a domestic donkey and a Somali wild ass; the type has not been preserved. The first available name thus becomes *Asinus africanus* von Heuglin & Fitzinger, 1866. A lectotype is designated: a skull of an adult female collected by von Heuglin near Atbara river, Sudan, and present in the Museum für Naturkunde in Stuttgart, SMNS 32026.". – p. 127: "There is unfortunately no associated skin; but the skull, that of an adult female, 485 mm in greatest length, is without doubt that of a genuine Nubian wild ass. The date of the collection is unknown, but there is no reason to doubt that it belonged to a specimen for von Heuglin was tangible evidence of wild-living *Equus asinus*.". – p. 132: Following the classification of Groves (1986) the synonymy of the two accepted subspecies: "1. *Equus (Asinus) africanus africanus* (von Heuglin & Fitzinger, 1866), Nubian Wild Ass (fig. 6). Lectotype from Atbara River, Sudan. Synonym: *dianae* (Dollman, 1935): Tokar, Sudan .... 2. *Equus (Asinus) africanus somaliensis* (Noack, 1884), Somali Wild Ass (fig. 7, 8). Holotype from the surroundings of Berbera, Somalia. Synonyms: *somalicus* Sclater, 1884: Berbera; *aethiopicus* Denman, 1957: Danakil, Ethiopia.".

Artiodactyla Owen, 1848
Bovidae Gray, 1821
Kobus Smith, 1840

Adenota megaceros Fitzinger, 1855: 247 (ex Heuglin manuscript, description insufficient), redescription by Heuglin 1863: 14. – Valid name: *Kobus megaceros* (Fitzinger, 1855).

Syntype: SMNS 588, male, skin and horns (bad condition), Bahr el Abiad, Sudan, leg. T. v. Heuglin, 1855. Type locality described by Heuglin: "am Sobat, Bahr-el-Ghazal und unteren Kir" covers a large area: Sobat River coming from South-east has its junction into White Nile at Doleib Hill and the mouth of Bahr-el-Ghazal (some 100 km in the West) flows into the White Nile at Lake No.

Comment: Heuglin (1863) used several specimens for his detailed description of this species. A lectotype was never designated so that the SMNS specimen remains a syntype.

Cetacea Brisson, 1762
Platanistidae Gray, 1846
Platanista Wagler, 1830

Platanista indi Blyth, 1859: 3. – Valid name: *Platanista minor* (Owen, 1853).

Neotype (designated by Pilleri & Gihr 1977): SMNS 45643, male, adult, skull, flipper, Chak, Indus, Pakistan, leg. Dr. G. Pilleri, 15 March 1976.

Rodentia Bowdich, 1821
Sciuromorpha Brandt, 1855
Sciuridae Fischer, 1817
Sciurus Linnaeus, 1758

Sciurus bongensis Heuglin, 1877: 59. – Valid name: *Heliosciurus bongensis* (Heuglin, 1877).

Holotype: SMNS 1093 (Fig. 2), male, juvenile, skull, additional number SMNS 5316 for the mounted skin; Djur-Gebiet, Bahr-el-Ghazal, Sudan, leg. T. v. Heuglin, 1863.

Comment: Thorington & Hoffmann (in Wilson & Reeder 2005) list *bongensis* Heuglin, 1877 (among 14 further taxa) as a subspecies of *H. gambianus*. Studies of Dieterlen (unpublished) and Kock (in litt.) revealed *bongensis* as a small form occurring in Sudan W of the Bahr el Jebel (White Nile), between 04° N and 12° N. We conclude that *Heliosciurus bongensis* is a valid species and different from *H. multicolor*, occurring in Sudan W of the White Nile – as did before Thomas & Hinton (1923) and Allen (1939). – A specimen of *bongensis*, SMF 4280, donated by Heuglin 1855 to E. Rüppell, was designated by Mertens (1925) as lectotype. But Kock (in litt.) revealed that the specimen's locality "was not part of even a cotype series of the species later described by Heuglin". This specimen Heuglin collected near the Djur River in the (former subdistrict) Bongo in the southern region of Bahr el-Ghazal – a locality far from the Terra typica Bahr el-Abiad of SMF 4280. So this specimen designated by Mertens loses its status as lectotype (ICZN Article 74. 2.).

Xerus Hemprich & Ehrenberg, 1833

Xerus Dabagala Heuglin, 1861[c]: 17. – Valid name: *Xerus rutilus* (Heuglin, 1877).

Lectotype [here designated]: SMNS 744, mounted specimen, Zeila, Somaliland, Berbera, Somalia, leg. T. v. Heuglin, 1861.

Comment: Heuglin did not designate a holotype. Also there is no number of investigated specimens mentioned. The species name *dabagala* is considered as synonym of *Xerus rutilus*.

Nesomyidae Major, 1897
Dendromus Smith, 1829

Dendromus kahuziensis Dieterlen, 1969: 348. – Valid.

Holotype: SMNS 14733, male, adult, skull, skin, D. R. Congo, Kahuzi, Bitale-Buloho (Parc National de Kahuzi-Biega), leg. F. Dieterlen, 23 February 1967.

Paratype: SMNS 22320, female, adult, skull, skin, D. R. Congo, Parc National de Kahuzi-Biega, collected ca. 300 m from the holotype locality, 21 January 1972, leg. F. Dieterlen.

Comment: SMNS 22320 is an additional specimen which was originally used for the description of this species, but this paratype were erroneously not mentioned in the publication.

Dendromus mystacalis Heuglin, 1863: 5. – Valid.

Holotype: SMNS 1055, male subadult, mounted specimen (Fig. 3), no skull, Eifaz (= Eifag), Bäschlo, N of Lake Tana, Ethiopia, leg. T. v. Heuglin, Mai 1862.

Comment: Musser & Carleton (in Wilson & Reeder 2005) quoted 11 synonyms. Dieterlen (2009) could show that the Ethiopian form differs morphologically and ecologically considerably from the non-Ethiopian forms of *D. mystacalis*. So it is questionable that all these are conspecific.

Dendromus ruppi Dieterlen, 2009: 190. – Valid.

Holotype: SMNS 27572, female, adult, skin (mounted on cardboard, Fig. 6), skull (Figs. 4, 5), Gilo, Imatong Mts., 1800–1900 m, East Equatoria, South Sudan, leg. Hans Rupp, 7 May 1978.

Paratypes: SMNS 27235, 27236, 27570–27575, 30086–30088; skins and skulls, same locality as holotype, all specimens leg. H. Rupp and G. Nikolaus between 1978 and 1979.

Megadendromus Dieterlen & Rupp, 1978

Megadendromus nikolausi Dieterlen & Rupp, 1978: 131. – Valid.

Holotype: SMNS 23982, female, adult, skull (Figs. 8, 9), skin (Fig. 7), Bale Goba Mts. 5 km S of Goba, Ethiopia, leg. G. Nikolaus, 26 June 1976.

Comment: Ethiopian endemic. Musser & Carleton (in Wilson & Reeder 2005): known by less than ten specimens.

Cricetidae Fischer, 1817
Microtus Schrank, 1798

Pitymys bavaricus König, 1962: 2. – Valid name: *Microtus bavaricus* (König, 1962).

Paratypes: SMNS 15307–15315, 15317, skulls, skins (15316 by exchange to ZFMK), [Germany, Bavaria] Garmisch-Partenkirchen, leg. C. König, 10 September 1959 to 26 April 1962.

Comment: Studies of Zagorodnyuk (1990) have shown that *Pitymys* is a subgenus of New-world *Microtus* and that the former old-world species of *Pitymys* should been replaced in the subgenus *Terricola*.

Muridae Illiger, 1811
Acomys I. Geoffroy, 1838

Mus albigena Heuglin, 1877: 69. – Valid name: *Acomys cahirinus* (Geoffroy, 1803).

Syntypes: Five specimens in alcohol, labelled as "Typus": SMNS 987a, two adult females, one juvenile and one separate large foetus; SMNS 987b, juvenile male. One extracted skull (separate No. 5477) of one of the females; all specimens from Keren (= Cheren), Bogos Country, Eritrea, leg. T. v. Heuglin, 1862.

Comment: Measures and proportions indicate *A. cahirinus*. In Musser & Carleton (in Wilson & Reeder 2005) *albigena* (Heuglin, 1877) is a synonym for *A. cahirinus*. Of a further synonym, *nubicus* (Heuglin, 1877), no specimens ever have been existed in the collection of SMNS.

Lophuromys Peters, 1874

Lophuromys medicaudatus Dieterlen, 1975: 295. – Valid.

Holotype: SMNS 13310, female, skull, skin, D. R. Congo (Kivu), Lemera-Nyabutera (near Kalehe), leg. Dr. F. Dieterlen, 17 March 1967.

Paratypes: SMNS 13314, male, skin, skull, Congo, Kivu PNKB, Bitale-Buloho, 4 May 1966; SMNS 13315, female, skin, skull, Congo Kivu, PNKB foot of Mt. Kahuzi, Marais near Mugaba, 28 February 1967; SMNS18012, male, skin,

skull, Congo, Kivu, PNKB, foot of Mt. Kahuzi, Marais Muzizi, 30 December 1971; SMNS 18015, male, skin, skull, Congo, Kivu, PNKB, foot of Mt. Kahuzi, Marais Muzizi, 9 February 1972; SMNS 18016, male, skin, skull, Congo, Kivu, foot of Mt. Kahuzi, 11 February 1972; all specimens leg. F. DIETERLEN.

Comment: This species belongs to the subgenus *Kivumys* Dieterlen, 1987. Information on it is summarized by DIETERLEN (1975, 1976, 1987); see MUSSER & CARLETON (in WILSON & REEDER 2005). – There is additional material which was originally used for the description of this species, but these paratypes were erroneously not mentioned in the publication.

Lophuromys cinereus DIETERLEN & GELMROTH, 1974: 337. – Valid name: *Lophuromys aquilus* (True, 1892).

Holotype: SMNS 18046, female, skull, skin, D. R. Congo, Kivu, Kahuzi-Biega-National Park, leg. F. DIETERLEN, 31 December 1971.

Paratype: SMNS 18045, female, skull, skin, same data as holotype, but 10 August 1971.

Comments: DIETERLEN (1987: 188) wrote: "Es ist nicht auszuschließen, dass die vier als *Lophuromys cinereus* beschriebenen Stücke graue Farbmutanten von *L. flavopunctatus* sind." [It cannot be excluded that the described *Lophuromys cinereus* specimens are only greyish colour mutants of *L. flavopunctatus*.]. This speculation was confirmed by VERHEYEN et al. (2002) when they compared the holotype of *L. cinereus* with *L. aquilus* (True, 1892). In the same paper these authors had demonstrated the conspecifity of six synonyms with *L. aquilus* hitherto included in the Ethiopian species of *L. flavopunctatus* (see MUSSER & CARLETON in WILSON & REEDER 2005).

Genus sp.

Meriones stigmonyx HEUGLIN, 1877: 78. – Nomen dubium.

Referred specimen: SMNS 1597a, female, (formerly mounted) skin, skull, East Kordofan, presumably leg. ERNST MARNO. Type specimens assumed to be in the SMNS collection, but could not be found.

Comment: Five out of nine specimens of gerbils assumed to be collected by HEUGLIN in Sudan, and still preserved in the SMNS were labelled as *Gerbillus stigmonyx*. One of them – adult, No. 1597a – had been mounted on a pedestal about in 1876 and removed from it in 1983 and the skull retracted (from the skin). The old label reads "*Dipodillus* Lat. *Gerbillus stigmonyx* Hgl., Ost-Kordofan (v. H. 1877)". Later the word "Typus" was added (certainly not by HEUGLIN himself, because he died in 1876). The measurements in the description translated in mm are by far too large for *Gerbillus*: HB: 120–130 mm, T: approx. 170 mm. Its origin from East Kordofan, and a note "Omkenea" (in the book of entries) where ERNST MARNO collected for the museums Vienna and Stuttgart does not at all agree with HEUGLIN's collecting locality "... nicht selten bei Khartum in sandigen Flächen ..." [... frequently found in the sandy surroundings of Khartoum...]. Thus the specimen 1597a cannot be *Gerbillus stigmonyx*. According to its appearance, measurements and skull characters it is clearly a *Taterillus* cf. *emini* (compare the account of *Taterillus macropus* Heuglin, 1864). No other specimen could be found in the collection which agrees with HEUGLIN's description. The whereabouts of any type specimen is unknown, probably a type did never exist.

Psammomys Cretzschmar, 1828

Psammomys elegans HEUGLIN, 1877: 80. – Valid name: *Psammomys obesus* (Cretzschmar, 1828).

Syntypes: SMNS 1574, male, skull, skin mounted, Schech Isle [Abdallah] near Suakin, Sudan; SMNS 35030, female, skull, skeleton, Schech Isle [Abdallah] near Suakin, Sudan; both specimens leg. T. v. HEUGLIN, January 1875.

Comment: HEUGLIN's first visit on the Schech Isle near Suakin was in July 1857 during his second African expedition (1857–1858). His next stay on Schech happened in January 1875 during his last expedition that ended three months later.

Taterillus Thomas, 1910

Meriones macropus HEUGLIN, 1864: 9. – Valid name: *Taterillus macropus* (Heuglin, 1864).

Holotype: SMNS 1098, male, skull (missing), mounted skin (Fig. 10), (Skel. Kat. No. 5396, original missing), Bongo, between Djur and Kosanga river, Sudan, leg. T. v. HEUGLIN.

Comment: ALLEN (1939) classified *Meriones macropus* as well to the genus *Gerbillus* (p. 325) as to *Tatera*. ELLERMAN (1941: 512, 514) also placed it – unfounded – as a synonym of *Tatera robusta* (Cretzschmar, 1830). The same classification was kept without comment by MUSSER & CARLETON (in WILSON & REEDER 2005), but now (in the former subgenus of *Tatera*) as *Gerbilliscus robustus*, and *macropus* (Heuglin, 1877) as synonym. – A careful investigation by DIETERLEN & TURNI (unpublished), however, proved that HEUGLIN had described his *Meriones macropus* as a species that was later described by THOMAS (1892: 78) as *Gerbillus emini*, and subsequently placed by him in the new genus *Taterillus* (THOMAS 1910: 222). The species name *macropus* has priority, so that *emini* must be treated as junior synonym (DIETERLEN, in prep.).

Arvicanthis Lesson, 1842

Mus rufodorsalis HEUGLIN, 1877: 70. – Valid name: *Arvicanthis abyssinicus* Rüppell, 1842.

Holo- or syntype: SMNS 1053, mounted specimen, skull, Semien, Wogara, Ethiopia, leg. T. v. HEUGLIN, 1863.

Comment: The specimen originally had been determined and labelled as *Arvicanthis abyssinicus*, presumably by F. KRAUSS. MUSSER & CARLETON (in WILSON & REEDER 2005) include *rufodorsalis* as a synonym of *A. abyssinicus*.

Colomys Thomas & Wroughton, 1907

Colomys goslingi eisentrauti DIETERLEN, 1983: 89. – Valid name: *Colomys eisentrauti* (Dieterlen, 1983).

Paratype: SMNS 32300, male, skull and skin, Bambului, Cameroon, leg. W. BÖHME, 8 March 1974.

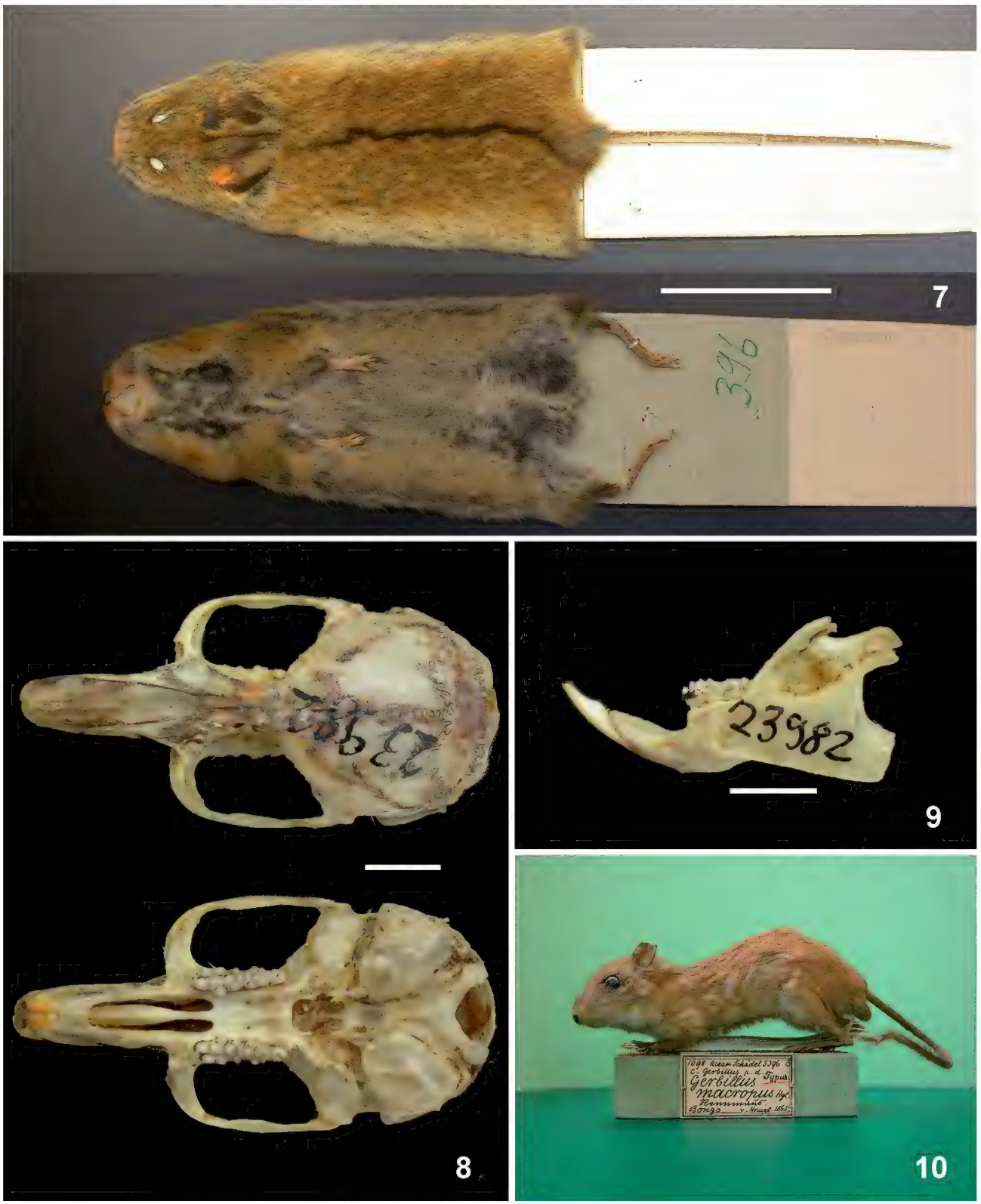
Comment: Received by exchange from ZFMK (No. 74.367). MUSSER & CARLETON (in WILSON & REEDER 2005) treat *eisentrauti* as synonym of *goslingi*, but HUTTERER & DIETERLEN (in prep.), consider it as a valid species.

Colomys goslingi ruandensis DIETERLEN, 1983: 89. – Valid.

Paratypes: SMNS 15017–15022, skulls and skins, Uinka, Ruanda, leg. F. DIETERLEN, 19 August – 4 September 1964.

Comment: The holotype (ZFMK 68.548) and three additional paratypes from the same period and the same collector are stored in ZFMK.

Figs. 2–6. African Rodentia. – **2**. *Heliosciurus bongensis* (Heuglin, 1877), holotype SMNS 1093, mounted skin. **3**. *Dendromys mystacalis* Heuglin, 1863, holotype SMNS 1055. **4–6**. *Dendromus ruppi* Dieterlen, 2009, holotype SMNS 27572, skull (4), jaw (5), skin (6). – Scales: 0.5 cm.



Figs. 7–10. African Rodentia. – **7–9**. *Megadendromus nikolausi* Dieterlen & Rupp, 1978, holotype, SMNS 23982, skull (8), jaw (9), skin (10). **10**. Mounted skin of *Taterillus macropus* (Heuglin, 1864), holotype SMNS 1098. – Scales: 5 cm (7), 0.5 cm (8, 9).

Dasymys Peters, 1875

Dasymys incomtus longipilosus EISENTRAUT, 1963: 132. – Valid.
Holotype: SMNS 5332, female, skull, skin, Musake-Hütte, Mt. Cameroon, Cameroon. leg. Prof. M. EISENTRAUT, 31 January 1954.
Paratypes: SMNS 5331, skull and skin, Buea, Mt. Cameroon, Cameroon, leg. Prof. M. EISENTRAUT, 15 January 1954; SMNS 5334, skull and skin, Manns Quelle, Mt. Cameroon, Cameroon, leg. Prof. M. EISENTRAUT, 26 April 1954

Grammomys Thomas, 1915

Grammomys minnae HUTTERER & DIETERLEN, 1984: 10. – Valid.
Holotype: SMNS 24118, female, skull, skin, Bulcha Forest near Dilla, Ethiopia, leg. G. NIKOLAUS, 1 February 1976.
Paratypes: SMNS 23624–23625, males, skulls and skins, Arba Minch, Ethiopia, leg. H. RUPP, 1971 and 1972.
Comment: An Ethiopian endemic species. Clearly different from *G. dolichurus* (Smuts, 1832) and *G. macmillani* (Wroughton, 1907) by karyotype.

Grammomys caniceps HUTTERER & DIETERLEN, 1984: 12. – Valid.
Paratype: SMNS 38200, male, skull, skin, skeleton, Malindi, Kenya, leg. R. HUTTERER, 15 July 1983.
Comment: ROCHE et al. (1984) assigned their sample to the *G. dolichurus* group, and noted the distinctive quality of this species, occurring in Somalia and Kenya, as indicated by chromosomal evidence.

Lemniscomys Trouessart, 1881

Mus zebra HEUGLIN, 1864: 10. – Valid name: *Lemniscomys zebra* (Heuglin, 1864).
Syntypes: SMNS 1100, male, skull, mounted specimen, Gazellenfluss (Bahr-el-Ghazal), "im Lande der Req-Neger, Djur und Bongo", Anglo-Egyptian Sudan, leg. T. v. HEUGLIN; SMNS 1100b, male, body in alcohol, Bongo, leg. T. v. HEUGLIN.
Comment: A member of the *L. barbarus* group. CARLETON & VAN DER STRAETEN (1997) distinguished this species from *L. barbarus*, which is endemic to the Barbarian province (Maghreb) of Northwest Africa.

Lemniscomys striatus dieterleni VAN DER STRAETEN, 1976: 431. – Valid.
Paratypes: SMNS 12331, 12369, 12379, 12382, 12483, 12509, 12512, 12592, 12605, 12656, 12659, 12684, 12693, 12703, 12706, 12723, 12724, 12759, 12770, 12772, 12784, 12827, 12837, 12850; all with skulls and skin, Kivu, Congo (D. R.), leg. F. DIETERLEN, 25 May 1963 – 12 January 1966.

Mastomys Thomas, 1915

Mus lateralis HEUGLIN, 1877: 71. – Valid name: *Mastomys erythroleucus* (Temminck, 1853).
Holo- or syntype: SMNS 1052, mounted specimen, Dembeja, Ethiopia, leg. T. v. HEUGLIN, 1863.

Micromys Dehne, 1841

Mus minutus sareptae HILZHEIMER, 1911: 18. – Valid name: *Micromys minutus* (Pallas, 1771).
Holotype: Missing.
Paratypes: SMNS 1233a "Nr. 11" and SMNS 1233b "Nr. 12"; both specimens from Sarepta, leg. GLITSCH, 1868.
Comment: HILZHEIMER designated the specimen "Nr. 10" as holotype. The collection entry book of SMNS listed originally three specimens from Sarepta, leg. GLITSCH 1868; however, the specimen "Nr. 10" had been identified as "*Mus wagneri sarepticus*" [handwritten label by HILZHEIMER?] and does not correspond with his description and measurements of *Mus minutus sareptae*.

Mus Linnaeus, 1758

Mus pallescens HEUGLIN, 1877: 72. – Valid name: *Mus musculus domesticus gentilis* (Brants, 1827) (fide ELLERMAN 1941: 246).
Holo- or syntype: SMNS 1101b, body in alcohol, skull extracted, Northern Sennaar, Sudan, leg. T. v. HEUGLIN.

Mus wagneri sareptanicus HILZHEIMER, 1911: 14. – Valid name: *Mus musculus wagneri* (Eversmann, 1848).
Holotype: SMNS 1232 ("Nr. 10"), specimen in alcohol, Sarepta, Russia, GLITSCH, 1868.
Paratypes: SMNS 1232 ("Nr. 9"), SMNS 1232b ("Nr. 14, 15"), specimens in alcohol, same data as holotype.
Comment: According to HILZHEIMER's description "Nr. 20" should be the holotype, but this number does not exist and the other numbers are out of question. "Nr. 10" probably bears the original handwritten label of HILZHEIMER: "Typus von *Mus wagneri sareptanicus*, Sarepta, GLITSCH 1868". HILZHEIMER's description is right alone of this specimen. The other are more different. The skin of the holotype is completely light-sandy coloured. The tail densely haired, T 67 mm, HF 16 mm (without claws), E 13 mm. Above the base of the ear its outer edge looks on both sides squeezed. The upper incisives bear no notch. – The other specimens are slightly smaller and darker coloured: No. 9: T 65 mm, Hf 14.5 mm, E 12 mm, ear not squeezed, incisives without notch. No. 14: T 68 mm, Hf 15 mm, E 11 mm, not squeezed. No. 15: T 51 mm, Hf 15 mm, E 10.5 mm, not squeezed.

Praomys Thomas, 1915

Praomys hartwigi EISENTRAUT, 1968: 8. – Valid.
Paratype: SMNS 35351, female, skull and skin Lake Oku, Banso-Highland, Cameroon, 2100 m, leg. Prof. M. EISENTRAUT, 30 January 1967.
Praomys hartwigi obscurus HUTTERER & DIETERLEN, 1992: 403 [in HUTTERER et al. 1992]. – Valid name: *Praomys obscurus* Hutterer & Dieterlen, 1992.
Paratypes: SMNS 41296–41307, 41320, skulls and skins; SMNS 41208, skull only, Gangirwal, Gotel Mts. (2300 m), Nigeria; SMNS 41309–41312, skulls and skins; 41313–41316, specimens in alcohol, Chappal Waddi, 1900, Nigeria, leg. G. NIKOLAUS, 17–26 March 1988.
Comment: HUTTERER's view (still in 1992) to treat this taxon as a full species, was followed by MUSSER & CARLETON (in WILSON & REEDER 2005) referring to HUTTERER's proposal (in litt., 2003). *P. obscurus* is morphologically similar and phylogenetically closely related to *P. hartwigi*. Both species are members of the *P. tullbergi* complex. – The holotype is stored in ZFMK (ZFMK 88.115).

Praomys misonnei VAN DER STRAETEN & DIETERLEN, 1987: 3. – Valid.

Holotype: SMNS 10555 [original No. D 8231], male, skull, skin, Irangi (Kivu) Zaire, leg. F. DIETERLEN, 12 August 1966

Paratypes: SMNS 10460, 10494, 10504, 10505, 10507, 10511, 10518, 10549, 10552, 10554, 10562, 10565, 10595, 10601, 10609, 10613, 10617, 10621, 10623, 10631, 10632, 10647, 10650, 10659, 10670, 20449, 20511, 20526, 20537, 20541, 20570, 20621; all specimens with skins and skulls, Irangi (Kivu), Congo D. R. leg. F. DIETERLEN from 4 June 1966 to 14 November 1972.

Comment: *Praomys misonnei* is a member of the *P. tullbergi* complex.

Rattus Fischer, 1803

Mus flavigaster HEUGLIN, 1861[c]: 18. – Valid name: *Rattus rattus* (Linnaeus, 1758) (var. *frugivorus*).

Holotype: SMNS 747 (additional number 5412 for the skull), male, skull, mounted specimen, Schech Isle, Said near Massaua (= Massawa), Eritrea, leg. T. v. HEUGLIN, 1859.

Comment: According to ALLEN (1939: 415) HEUGLIN could have confounded this specimen with *Mus flaviventris* Brants, 1827, then its valid name is *Rattus rattus frugivorus*. Its appearance fits well to this widespread colour phase of *Rattus rattus*.

Stenocephalemys Frick, 1914

Praomys ruppi VAN DER STRAETEN & DIETERLEN, 1983: 121. – Valid name: *Stenocephalemys ruppi* (Van der Straeten & Dieterlen, 1983).

Holotype: SMNS 23160, female, adult, skin and skull, Bonke, N of Bulta, (2800–3200 m), Ethiopia, leg. HANS RUPP, 9 March 1974.

Paratypes: SMNS 23128, 23150–23156, 23159, 6 males and 3 females, skulls and skins, a few skulls missing, Bulta and Bonke, N of Bulta, Ethiopia, leg. HANS RUPP, 8/9 March 1974.

Comment: Originally described as a species of *Praomys* based on material collected as "*Praomys albipes*, stenocephaler Typ" (RUPP 1980). The integration within the genus *Stenocephalemys* is not yet definitely established, but MUSSER & CARLETON (in WILSON & REEDER 2005) write "all available data about *ruppi* support its transfer from *Myomys* (= *Myomyscus*) to *Stenocephalemys*".

Otomys Cuvier, 1824

Oreomys [sic!] *typus* HEUGLIN, 1877: 77. – Valid name: *Otomys typus* (Heuglin, 1877).

Holotype: SMNS 1051, mounted specimen, skull is missing, Semien Mts., Ethiopia, leg. T. v. HEUGLIN, 1863.

Otomys occidentalis DIETERLEN & VAN DER STRAETEN, 1992: 386. – Valid.

Holotype: SMNS 41336, male, adult, skull and skin, Chappal Waddi (1900 m), E Nigeria, leg. G. NIKOLAUS, 23 March 1988.

Paratype: SMNS 41335, female, skull, skin (without fur), Gangirwal, Gotel Mts. (2300 m), E Nigeria, leg. G. NIKOLAUS, 17–23 March 1988.

Comment: A species with five laminae on lower M 1, closely related to *O. barbouri* (Lawrence & Loveridge, 1953) and *O. lacustris* (G. M. Allen and Loveridge, 1933) in mountains of Eastern Africa. The two skins of SMNS 41335, 41336, badly protected, were completely depilated as a damage done by moths. Two further paratype specimens sampled by the same collector, are deposited at ZFMK, No. 88.139/140.

Hystricomorpha Brandt, 1855
Bathyergidae Waterhouse, 1841
Cryptomys Gray, 1864

Georychus ochraceo-cinereus HEUGLIN, 1864: 3. – Valid name: *Cryptomys ochraceocinereus* (Heuglin, 1864).

Holotype: SMNS 1095, female, skull (separate number 5507), right zygomatic arch missing, mounted specimen, Bongo, Dembo, Kosanga-River, Bahr-el-Ghazal, Sudan, leg. T. v. HEUGLIN, 1863.

Comment: A redescription including additional specimens (leg. H. RUPP and G. NIKOLAUS), and comparisons with other taxa of *Cryptomys* occurring north of the equator will be published by DIETERLEN (in prep.).

Thryonomyidae Pocock, 1822
Thryonomys Fitzinger, 1867

Aulacodus semipalmatus HEUGLIN, 1864: 5. – Valid name: *Thryonomys swinderianus* (Temminck, 1827).

Holotype: SMNS 1089, female, skull, mounted specimen, West of the Djur River, to Fertit and Njam-njam country, upper Bahr-el-Ghazal, Anglo-Egyptian Sudan, leg. T. v. HEUGLIN, 1863.

Comment: According to the description the skin is damaged by spears. The name *semipalmatus* is a synonym and hitherto not known as a subspecies. This specimen served also for FITZINGER's description of the genus *Thryonomys* in 1867. A redescription and comparisons with other forms will be published by DIETERLEN (in prep.).

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